DOCUMENT RESUME

ED 450 680 HE 033 856

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TITLE	From Bachelor's Degree to Work: Major Field of Study and Employment Outcomes of 1992-93 Bachelor's Degree Recipients Who Did Not Enroll in Graduate Education by 1997. Statistical Analysis Report. Postsecondary Education Descriptive Analysis Reports.
INSTITUTION	National Center for Education Statistics (ED), Washington, DC.; MPR Associates, Berkeley, CA.
REPORT NO	NCES-2001-165
PUB DATE	2001-02-00
NOTE	111p.
AVAILABLE FROM	ED Pubs, P.O. Box 1398, Jessup, MD 20794-1398. Tel: 877-433-7827 (Toll Free); Web site: http://www.ed.gov/pubs/edpubs.html.
PUB TYPE	Numerical/Quantitative Data (110) -- Reports - Research (143)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*College Graduates; Degrees (Academic); Employment Qualifications; Higher Education; *Income; Labor Market; *Majors (Students); *Undergraduate Students
IDENTIFIERS	*Return on Investment

ABSTRACT

The analysis described in this report investigated the relationship between undergraduate major and early employment outcomes among 1992-1993 college graduates who did not pursue graduate education within 4 years after earning their bachelors' degrees (i.e., as of 1997). These college graduates represented 70% of all graduates, and most entered the labor market immediately after finishing their degree. The analysis is based on the Baccalaureate and Beyond Longitudinal Study, which tracked students who received a bachelor's degree in 1992-1993. The findings of this study confirm what has been reported consistently in other studies about earnings: college graduates who major in the fields of engineering, business, computer science, nursing, and other health fields earn higher than average full-time salaries. Taking into account other aspects of employment, including job stability, job benefits, and job satisfaction, engineering and computer science stood out as the fields with the most consistent favorable employment outcomes for bachelor's degree recipients. In contrast, education and humanities and arts majors experienced the least favorable outcomes. Graduates of nursing, business, and engineering programs experienced greater than average job stability. Study findings demonstrate substantial gender differences in earning. By 1997, men earned more than women in all fields of study except engineering, health (other than nursing) and humanities and arts. Appendixes contain a glossary and technical notes. (Contains 20 tables, 3 figures, and 16 references.) (SLD)

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Statistical Analysis Report **February 2001**

Postsecondary Education Descriptive Analysis Reports

From Bachelor's Degree to Work

Major Field of Study and Employment Outcomes of 1992–93 Bachelor's Degree Recipients Who Did Not Enroll in Graduate Education by 1997

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Suggested Citation
U.S. Department of Education. National Center for Education Statistics. *From Bachelor's Degree to Work: Major Field of Study and Employment Outcomes of 1992–93 Bachelor's Degree Recipients Who Did Not Enroll in Graduate Education by 1997*, NCES 2001–165, by Laura J. Horn and Lisa Zahn. Project Officer: C. Dennis Carroll. Washington, DC: 2001.

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Executive Summary

The analysis described in this report investigates the relationship between undergraduate major and early employment outcomes among 1992–93 college graduates who did not pursue graduate education within four years after earning their bachelor's degree (i.e., as of 1997). These college graduates represented 70 percent of all graduates, and most entered the labor market immediately after finishing their degree.

The 1992–93 college graduates entered a labor market in the midst of an economic recovery following a two-year recession (Mishel and Bernstein 1994, p. 13). By 1997, the economy was strong and jobs were plentiful. Four years after most earned their bachelor's degree, nearly all college graduates who had not enrolled in graduate school were working full time. The findings of this study confirm what has been reported consistently in other studies about earnings: college graduates who major in the applied fields of engineering, business, computer science, nursing, and other health fields earn higher than average full-time salaries.

This study also examined other aspects of employment including job stability, job benefits, and job satisfaction. Taking into account all these aspects along with salary, engineering and computer science stood out as the fields with the most consistent favorable employment outcomes for bachelor's degree recipients. In contrast, education and humanities and arts majors experienced the least favorable outcomes. Graduates of nursing, business, and engineering programs experienced greater than average job stability.

Results were mixed for social science and biological science majors. Those in social sciences reported lower than average salaries in 1994, but not in 1997. The opposite was true for those majoring in biological and interdisciplinary sciences: they reported average salaries in 1994, but in 1997 their salaries were lower than average. The salaries of mathematics and physical science majors did not differ from those of all graduates in either year, nor did the rate at which their full-time salaries increased between 1994 and 1997.

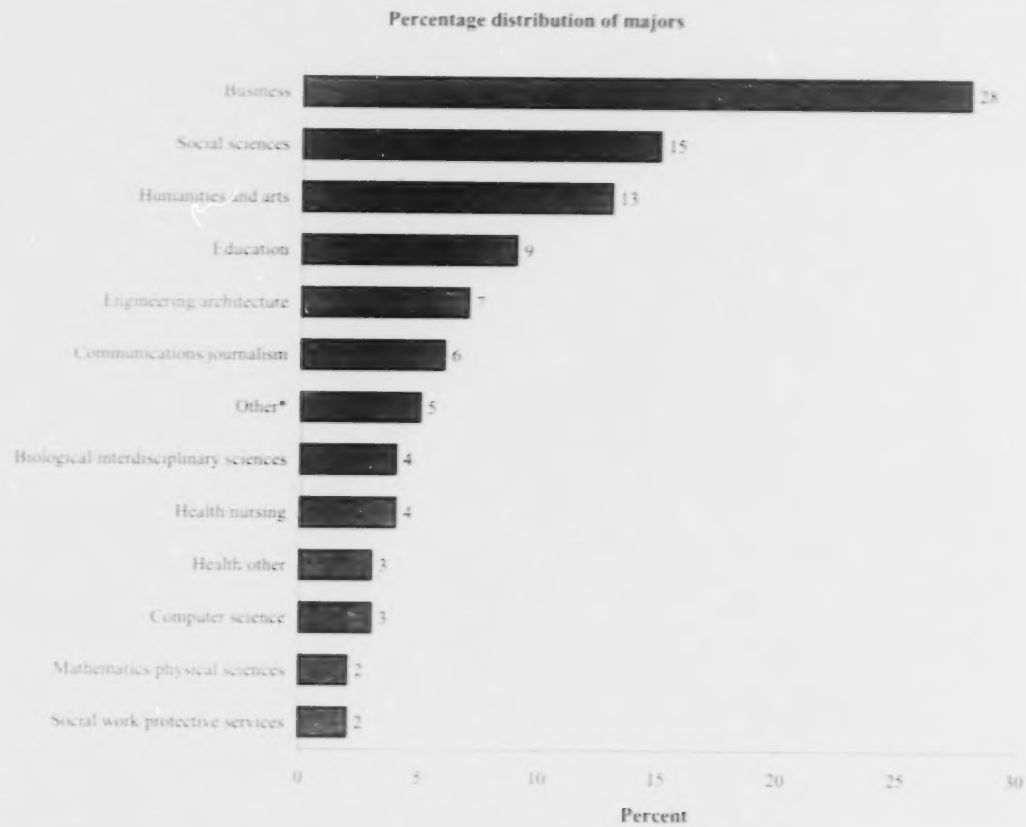
Field of Study

By far, the most popular undergraduate field of study was business. Over one-quarter (28 percent) of 1992–93 college graduates who did not attend graduate school by 1997 had majored in a business-related field. Following business, 15 and 13 percent, respectively, had majored in social sciences or humanities and arts. Nearly 1 in 10 had majored in education (9 percent), while approximately 7 percent had majored in engineering or architecture[1] (figure A).

Consistent with historically gender-dominated fields, men were more likely to major in engineering (13 versus 2 percent), computer science (4 versus 2 percent), and business (32 versus 24 percent), while women were more likely to major in education (13 versus 4 percent), nursing (6 versus 1 percent), and other health fields (4 versus 2 percent).

[1]Nearly all were engineering majors; less than 1 percent of all graduates majored in architecture. Henceforth, they are referred to as "engineering majors."

Figure A—Percentage distribution of major field of study for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997



*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Business fields tended to attract older college graduates: more than one-third of graduates age 30 or older when receiving their bachelor's degree had majored in business (35 percent), compared with just over one-quarter (27 percent) of those 23 or younger. Asian/Pacific Islander college graduates were more likely than black, non-Hispanic graduates to favor engineering as a major. To further illustrate racial/ethnic group differences in undergraduate major, a report based on the Integrated Postsecondary Education Data System (IPEDS) institutional survey in 1992 also showed that black, non-Hispanic graduates were more likely than others to complete degrees in business management and were less likely to earn degrees in education or health (U.S. Department of Education 1995).

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1997 Employment Status and Occupation

Unemployment was not a problem for most 1992–93 college graduates who had not pursued graduate education. In 1997, within four years of graduating, just 2 percent were unemployed,[2] while almost all (86 percent) reported working full time. Compared with all graduates, business, engineering and computer science majors were more likely to be employed full time (over 90 percent), while humanities and arts majors were less likely to work full time (79 percent).

Job stability, as measured by the percentage of graduates with any unemployment spells, the number of jobs worked since bachelor's degree attainment, and the average number of months worked in the April 1997 job, was high for graduates who had majored in nursing, engineering, or business. Graduates in all three fields worked in fewer jobs than all graduates and had worked in their April 1997 job longer (table A). Nursing majors also were much less likely to report any spells of unemployment since earning their bachelor's degree. Conversely, those with majors in communications/journalism or humanities and arts fields worked in more jobs since graduation and fewer months in their April 1997 job than all graduates.

College graduates who had majored in applied fields[3] were very likely to be employed in occupations related to their majors (table B). This was especially true for those majoring in nursing and other health fields, among whom 96 percent and 68 percent, respectively, were employed as medical professionals. In addition, nearly three-quarters of education majors (74 percent) worked as teachers, and 60 percent of engineering majors as engineers.[4] Similarly, 60 percent of social work/protective service majors were working in social service fields. There was an exception to this pattern, however, for communications/journalism majors who were more likely than graduates in any other field to be working in service occupations (33 percent).

For academic fields,[5] roughly one-quarter of college graduates with majors in either biological sciences or mathematics/physical sciences were working as teachers, and roughly the same percentage in both fields worked in occupations related to research, science, or technical work. Social science majors, on the other hand, were likely to be employed in business occupations (32 percent), followed by either service occupations (18 percent) or human and protective services (16 percent).

Full-Time Salaries

As shown in table C, college graduates with degrees in nursing or other health fields reported higher than average full-time salaries for their April 1994 job, compared with all graduates ($34,194 and $35,515, respectively, versus $26,464).[6] The same applied to those who had

[2]As a point of comparison, the overall unemployment rate was 5 percent in 1997 (U.S. Department of Labor 1999, table 56).

[3]Applied fields in this study are education, business, engineering/architecture, computer science, nursing, other health fields, social work/protective services, and communications/journalism.

[4]The National Science Foundation reports that 57 percent of engineering majors work in a job closely related to their degree 1 to 5 years after bachelor's degree attainment (National Science Board 2000, Appendix table 3-1).

[5]Academic fields include humanities and arts, biological sciences, mathematics and physical sciences, and social sciences.

[6]The 1994 salaries are in 1997 dollars for comparability to 1997 salaries.

Table A—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, the average number of jobs worked, the percentage with any unemployment, and the average number of months worked at April 1997 job, by major field of study

	Average number of jobs begun since graduation	Percentage with any unemployment since graduation	Number of months worked in April 1997 job[1]
Total	2.3	39.5	27.5
Bachelor's degree major			
Applied fields			
Education	2.6	51.7	28.1
Business	1.9	33.1	29.8
Engineering/architecture	1.8	40.6	32.0
Computer science	1.9	39.4	29.6
Health nursing	1.6	19.0	32.8
Health other	1.9	30.0	30.9
Communications/journalism	2.8	47.3	24.3
Social work/protective services	2.2	36.6	29.3
Academic fields			
Humanities and arts	2.9	46.5	23.9
Biological/interdisciplinary sciences	2.5	48.8	25.3
Mathematics/physical sciences	2.5	42.9	27.5
Social sciences	2.5	41.9	25.2
Other[2]	2.3	34.8	25.9

[1] Maximum possible is 52. Dates were bounded between 1/1/93 and 4/30/97.

[2] Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Compared to all graduates: gray box = higher than average; white box = lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

majored in either engineering ($32,217) or business ($29,017). In contrast, education majors had lower than average 1994 full-time salaries ($20,443),[7] as did those with majors in social work/protective services ($21,328), communications/journalism ($22,170), humanities and arts ($22,359), and social sciences ($23,166).

In 1997, with a few exceptions, similar salary patterns emerged. The exceptions were computer science majors who earned a substantially higher than average 1997 salary ($44,624 versus $34,310), and biological science majors who earned a lower than average salary ($28,760). In addition, communications/journalism majors no longer earned lower than average salaries in 1997. For education majors, graduates not only reported

[7] It is possible that some of the salaries reported by education majors (73 percent of whom were working as educators) were for a 9-month academic year rather than a 12-month year.

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Table B—Percentage distribution of 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, according to their occupation in April 1997, by major field of study

	Educators	Business or management	Engineering software engineers architecture	Computer science	Medical professionals	Editors writers performers	Human protective service professionals	Research scientists technicians	Administrative clerical legal support	Mechanics laborers	Service occupations
Total	12.5	29.3	5.4	4.9	7.0	4.9	5.9	4.7	5.5	3.9	14.6
Bachelor's degree major[1]											
Applied fields											
Education	73.9	7.0	0.0	0.3	2.1	1.0	1.4	1.2	4.3	2.8	5.2
Business	3.7	55.8	0.8	5.2	0.5	0.9	2.0	1.8	4.7	3.5	20.3
Engineering	1.4	7.5	59.7	6.1	1.1	1.0	0.5	9.0	1.2	7.5	3.9
Computer science	3.7	12.5	12.9	57.9	1.0	0.0	0.9	3.3	1.3	2.2	3.3
Nursing	0.5	2.8	0.0	0.5	96.2	0.0	0.0	0.0	0.0	0.0	0.0
Health other	7.3	7.5	0.0	0.9	68.3	0.0	3.3	3.6	2.7	0.5	6.0
Comm. journalism	4.1	22.8	0.3	2.8	0.6	23.0	1.9	3.2	5.6	2.5	33.0
Social work prot. serv.	6.8	10.5	0.0	0.0	2.0	0.0	59.8	0.9	10.9	1.6	6.7
Academic fields											
Humanities	17.8	23.4	1.0	3.7	2.0	17.0	4.8	4.0	6.3	3.8	15.0
Biological interdis. sci.	24.6	14.6	1.5	0.8	16.2	1.7	1.5	23.6	2.3	5.2	6.2
Math phys. sciences	26.2	11.5	9.0	7.3	0.8	0.6	1.7	24.0	5.6	4.0	8.4
Social sciences	8.8	31.9	0.3	1.2	3.1	2.3	16.4	3.5	9.3	3.0	17.7
Other[2]	8.0	32.0	1.2	1.5	3.5	5.6	8.8	5.0	5.4	12.3	15.2

[1] For full labels of major fields see table A.

[2] Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details do not sum to 100 because the "other" occupation group (1.4 percent) is not included. Gray boxes indicate the occupations with the highest percentage of graduates for a given major. If less than 50 percent, then two or more occupations (up to 50 percent) were identified.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

lower than average salaries in *both* 1994 and 1997 but also experienced lower rates of salary increase than did all graduates.

Job Benefits and Job Satisfaction

With respect to their job held in April 1997, engineering majors reported very favorable outcomes and were generally very satisfied with their employment. For example, engineering was the only field in which graduates were more likely than all graduates to report that their job both required a degree *and* had definite career potential (54 versus 38 percent). Engineering majors also were more likely than all graduates to report that their jobs provided health insurance, paid vacations, retirement benefits, family leave, and outside job training (table D1). Computer science

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Table C—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, full-time salaries in 1994 and 1997, and for those employed full-time in both 1994 and 1997, the average percent increase in salary between 1994 and 1997, by major field of study

	Full-time 1994 salary in 1997 dollars	Full-time 1997 salary	Percent increase in salary if full time in 1994 and 1997
Total	526,464	534,310	24.5
Bachelor's degree major			
Applied fields			
Education	20,443	24,543	18.2
Business	29,017	37,448	25.1
Engineering architecture	32,217	42,931	25.2
Computer science	29,428	44,624	31.2
Health nursing	34,194	37,012	10.9
Health other	35,515	42,066	17.2
Communications journalism	22,170	32,294	28.7
Social work protective services	21,328	27,350	21.7
Academic fields			
Humanities and arts	22,359	29,630	25.6
Biological interdisciplinary sciences	25,380	28,760	22.4
Mathematics physical sciences	25,958	31,565	23.6
Social sciences	23,166	33,463	26.8
Other*	24,694	33,374	23.4

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation

NOTE: Compared to all graduates: gray box = higher than average, white box = lower than average ($p<0.05$)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System

majors also fared well with respect to job benefits: they were more likely than all graduates to report receiving health insurance benefits, paid sick leave, paid vacation, retirement, and family leave benefits. In contrast, humanities and arts majors were less likely than all graduates to report receiving any of the benefits reported in the survey, while education majors were less likely to report working in jobs that provided paid vacations.

Few differences were found across fields of study with respect to measures of job satisfaction (table D2). Engineering majors and health (other than nursing) majors were more likely than all graduates to report being very satisfied with pay. Conversely, education and humanities and arts majors were less likely to be very satisfied with pay. Engineering was the only field in which majors were more likely than all graduates to report

Table D1— Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various job benefits offered at their April 1997 job, by major field of study

	Health insurance	Paid sick leave	Paid vacation	Retirement	Family leave	Job training outside the job
Total	85.9	83.0	86.1	78.0	66.1	43.8
Bachelor's degree major						
Applied fields						
Education	81.4	83.3	74.6	77.8	60.3	44.0
Business	90.1	84.5	91.2	81.1	67.3	47.2
Engineering/architecture	93.2	85.0	94.7	85.9	73.9	54.2
Computer science	94.8	91.5	95.4	87.9	79.7	48.2
Health/nursing	87.5	87.7	87.2	86.8	68.9	55.8
Health/other	88.5	84.2	88.1	82.5	73.6	42.1
Communications/journalism	83.7	80.9	84.3	77.1	65.2	38.6
Social work/protective services	83.1	84.7	87.3	76.7	64.6	40.7
Academic fields						
Humanities and arts	78.1	76.7	79.4	67.7	58.5	37.1
Biological/interdisciplinary sciences	79.7	80.7	79.8	71.9	57.3	37.8
Mathematics/physical sciences	89.5	86.5	81.4	80.6	79.8	40.7
Social sciences	85.8	82.9	85.2	76.8	66.8	43.7
Other*	84.0	77.9	80.9	74.0	60.1	42.6

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: Compared to all graduates: gray box = more likely than average to report; white box = less likely than average to report ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B 93/97), Data Analysis System.

high satisfaction with co-workers, while computer science was the only field in which majors reported high satisfaction with working conditions more often than all graduates. Finally, education was the only field in which majors were more likely than all graduates to report being very satisfied with the challenge the job offered.

Gender Differences

The findings of the study illustrated substantial gender differences in earnings among 1992–93 bachelor's degree recipients who did not enroll in graduate school by 1997. These differences were more apparent in 1997, four years after most graduates had earned their bachelor's degree, than when graduates first entered the labor market. Looking at individual fields of study, in 1994 men with majors in business, computer science, communications/journalism, and social sciences earned higher salaries than women majoring in these fields. By 1997, men earned more than women in all fields of study except engineering, health (other than nursing), and humanities and arts (figure B).

Table D2—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting being very satisfied with various aspects of their April 1997 job, by major field of study

	Very satisfied with						
	Pay	Job security	Job challenge	Fringe benefits	Promotion opportunity	Co-workers	Working conditions
Total	32.6	63.0	55.8	52.8	38.3	79.6	55.6
Bachelor's degree major							
Applied fields							
Education	27.0	64.1	66.3	45.8	31.8	78.7	50.4
Business	34.3	61.5	52.7	54.3	42.1	80.0	58.5
Engineering/tech. fields	42.0	66.4	59.4	57.6	46.1	85.4	54.4
Computer science	40.7	62.8	59.7	65.9	43.9	78.7	69.4
Health nursing	38.0	55.8	62.1	48.4	33.5	79.1	41.6
Health other	48.4	70.4	63.3	54.4	27.3	75.9	51.9
Communications/journalism	30.9	65.3	54.6	60.1	42.3	81.3	56.5
Social work/protective services	33.9	66.9	60.4	53.7	33.6	76.9	48.9
Academic fields							
Humanities and arts	26.6	60.7	53.1	51.0	34.1	79.2	54.9
Biological/interdisciplinary sciences	23.9	57.6	50.8	41.5	28.1	73.4	46.4
Mathematics/physical sciences	35.1	62.5	49.9	51.5	30.5	77.7	52.7
Social sciences	29.3	66.0	52.9	50.8	36.4	79.7	53.7
Other*	34.1	69.0	59.0	50.6	44.2	82.4	59.9

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Compared to all graduates: gray box = more likely than average to report; white box = less likely than average to report ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

In a multivariate analysis conducted separately for men and women, several factors, including age, race/ethnicity, and work experience were associated with women's 1997 salaries, but not with men's salaries. Specifically, after controlling for related variables including major field of study, women age 30 or older when they received their bachelor's degree earned higher salaries than women 23 or younger, as did Asian/Pacific Islander women compared with white women, and women who did not work in any overlapping jobs compared with those who did. For men, on the other hand, only major field of study and institution attended (those attending doctoral-granting private, not-for-profit institutions earned more than men in comparable public institutions) predicted their 1997 salaries. These results suggest that women may be subjected to greater scrutiny in entering and advancing in the labor market.

Finally, when asked why they took their 1997 jobs, women were more likely to report that they chose their job because it provided interesting work. In contrast, men were more likely to do so for the job's advancement opportunities or income potential.

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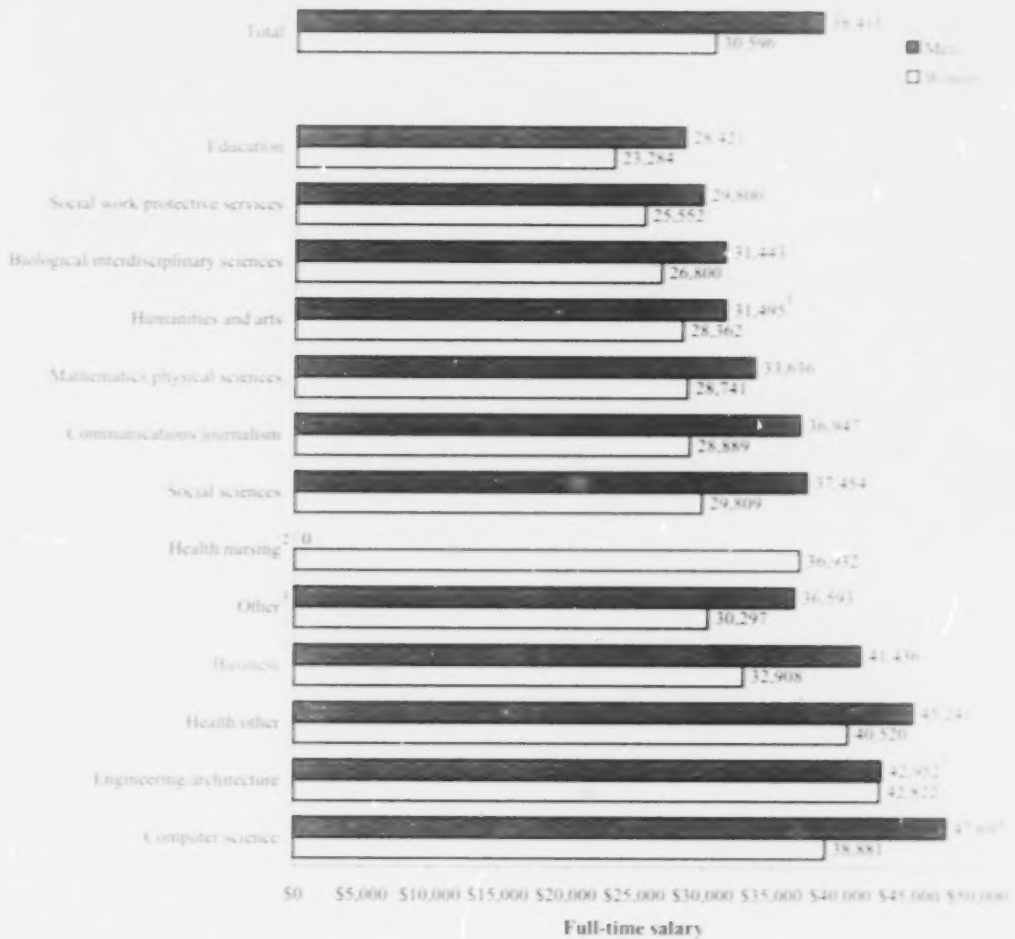
Figure B— Average full-time salaries for men and women in 1997 among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, by major field of study



Male and female salaries not statistically different.

Not enough men for a reliable estimate.

Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

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Foreword

This study investigates the relationship between undergraduate major and employment outcomes for college graduates who did not enroll in graduate school. The analysis is based on the Baccalaureate and Beyond Longitudinal Study (B&B:93), which tracks students who received a bachelor's degree in academic year 1992–93. Participants were sampled and surveyed in their year of graduation as part of the 1993 National Postsecondary Student Aid Study (NPSAS:93). The base-year study consisted of two components: an institutional survey that provided extensive information on students' enrollment and financial aid and a student survey. The First Follow-up (B&B:93/94) was conducted 1 year later, and provided additional information that is comparable to that collected in the Recent College Graduates (RCG) series of cross-sectional surveys. As part of the First Follow-up, participants' undergraduate transcripts were also collected from the B&B sample institutions. In 1997 (approximately 4 years after graduation), B&B participants were contacted again for the Second Follow-up (B&B:93/97). In both follow-up surveys, participants reported on many aspects of their employment.

While B&B:93/94 provided continuity with earlier cross-sectional surveys, B&B:93/97 highlights the benefits of B&B's longitudinal design. Some issues, such as access to and participation in graduate education and labor market outcomes require a longer time lag than 1 year after graduation to observe outcomes of interest. Furthermore, the longitudinal design permits a comparison of outcomes at different points in time for bachelor's degree recipients.

Acknowledgments

The authors wish to thank the many individuals who contributed to this report. At NCES Paula Knepper provided a comprehensive technical review of the methods and content. Roz Korb also reviewed the first draft and Bruce Taylor reviewed the final draft and served as the adjudication chairman. Other Department of Education reviewers included Donald Conner (Office of Postsecondary Education), Joanell Porter (Elementary, Secondary Longitudinal Studies Division), and Michael Ross (Early Childhood and International and Crosscutting Studies). Special thanks also to Brian Trzebiatowski of the American Association of State Colleges and Universities for his review of the final draft.

At MPR Associates, special thanks go to Barbara Kridl for overseeing the production process, Francesca Tussing and Renee Macalino for formatting the tables and preparing the final layout, and Andrea Livingston for editing and proofreading the report. Helen Jang provided invaluable administrative and technical support at all stages of development and production.

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Introduction

No one disputes the economic benefits of earning a bachelor's degree.[1] College graduates as a whole earn considerably more than high school graduates, and the wage gap between these two groups has been growing.[2] In addition, more and more students are enrolling in college to increase their employment opportunities and marketability. For example, in 1999, three-quarters of college freshmen reported that "being able to make more money" strongly influenced their decision to attend college (Sax et al. 1999, p. 50). In contrast, just over half (54 percent) reported the same in 1976 (Astin 1993, p. 245).

Among college graduates, however, students' employment outcomes vary considerably according to what they choose to study. A number of researchers have demonstrated the effect of undergraduate major on career earnings (e.g., Grogger and Eide 1995; Rumberger and Thomas 1993). There is general consensus from these and other studies that applied undergraduate fields such as engineering, business, and to a lesser extent, health, command higher salaries than do fields in humanities and arts and social sciences. According to Pascarella and Terenzini (1991), one explanation for these differences may be that the applied fields such as business or engineering are "characterized by a relatively well defined body of knowledge and skills, an emphasis on scientific or quantitative methods of inquiry, and quite often, an applied orientation" (p. 516). For jobs not directly related to college majors, employers also may use undergraduate major as a way of sorting out applicants, believing that those majoring in more applied and quantitative fields have had more rigorous training or are generally brighter than other students (Pascarella and Terenzini 1991).

However, some evidence indicates that social science and humanities and arts majors have greater potential for succeeding in corporate management positions than do their counterparts majoring in engineering and mathematics. In a study conducted by AT&T in 1984, the author concluded that undergraduate major "was the strongest predictor of managerial performance and progress" for employees participating in a longitudinal study of managers (AT&T 1984, p. ii). While humanities and arts and social science majors were relatively weak in quantitative abilities, they were particularly strong in interpersonal and verbal skills. According to the same study,

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[1]For a review, see chapter on "Economic Benefits of College," in Pascarella and Terenzini (1991, pp. 500–537).

[2]According to Mishel and Bernstein (1994, p. 138), the "college wage premium" (as a ratio of high school graduates' earnings to college graduates' earnings) grew from about 0.29 to 0.43 from 1970 to 1989. Between 1989 and 1995, the gap grew at a much slower rate, to 0.45.

business majors were a "strong second" in managerial abilities. In contrast, though they exhibited strong quantitative skills, engineers and mathematics/science majors were relatively weak with respect to other managerial characteristics.

Despite college students' increased motivation to seek a college education in order to position themselves better in the labor market, and despite the growth in the technology industry, between 1986–87 and 1996–97 students actually moved away from majoring in certain applied fields such as engineering and computer science. For example, the number of degrees awarded in engineering fields declined 19 percent, and those awarded in computer and information sciences dropped 37 percent (U.S. Department of Education 1999, table 255). At the same time, due in large part to increased enrollment by women, the number of degrees conferred in social science, psychology, and biological sciences increased substantially over the same 10-year period.

How have recent college graduates fared in the job market with respect to their undergraduate field of study? That is the main question addressed in this study. This study adds to earlier research on how students' undergraduate major affects their employment in several ways. First, it is based on relatively recent data—students who earned their bachelor's degree in 1992–93—and is limited to students who had never enrolled in graduate education. Second, it analyzes changes in graduates' employment status and annual salary between the time they first entered the labor market (one year after graduation) and four years later. Third, the analysis also examines the association between undergraduate major and other employment outcomes such as the job stability, the availability of benefits, and the general job satisfaction reported by college graduates.

Because the survey used for this study extends four years after most of the participants completed their bachelor's degree, a major consideration that this study could not address is long-term outcomes. But consistent with the AT&T study discussed above, there is some evidence that college graduates who major in humanities and arts and social science fields do better with respect to earnings and job advancement in the long term (i.e., 10 years or more later) than their peers who major in applied fields.[3]

[3] As reported by Pascarella and Terenzini (1991) in their review.

Data and Methods

The analysis is based on data from the Baccalaureate and Beyond Longitudinal Study (B&B) representing college graduates who received their bachelor's degree in the academic year 1992–93. Survey participants were initially sampled from the National Postsecondary Student Aid Study (NPSAS:93) and were first surveyed in their senior year of college. They were later followed up in 1994 and 1997, approximately one year and four years after graduation. For this study, the sample is based on respondents who participated in all three surveys, approximately 83 percent (about 9,000) of respondents among the original eligible participants. The sample was further limited to graduates who had not enrolled in graduate school as of 1997, about 70 percent of all graduates.

The main analytic variable used in the study is undergraduate field of study. It is based on the major listed on students' undergraduate transcripts. If more than one major was reported, the variable is based on the first one listed. Major was aggregated and coded to distinguish among different applied fields of study. For example, nursing was distinguished from other health fields, and computer science from engineering.

Applied Fields

Education
Early childhood
Elementary
Secondary
Special
Physical
Other

Business
Accounting
Finance
Business/management systems
Management/business administration
Marketing/distribution

Engineering/architecture
Architecture
Engineering: Electrical
Engineering: Chemical
Engineering: Civil
Engineering: Mechanical
Engineering: Other
Engineering technology

Computer science
Computer programming
Computer and information sciences

Health/nursing
Health: Nursing

Health/other
Allied health: Dental/medical tech
Allied health: Community/mental health
Health/phys ed/recreation (HPER)
Allied health: Nurse assisting
Allied health: General and other
Health: Audiology

Health: Clinical health science
Health: Health/hospital administration
Health: Other
Health: Dietetics

Communications/journalism
Journalism
Communications
Communication technology

Social work/protective services
Clinical pastoral care
Protective services
Social work
Public administration, NOT social work

ACADEMIC FIELDS

Humanities/arts/history/liberal studies
American civilization
Area studies
African American studies
Ethnic studies, NOT black/area studies
Spanish
Foreign Languages: Non-European
Foreign Languages: European, NOT Spanish
Letters: English/American literature.
Letters: Creative/technical writing
Letters: Other
Liberal studies
Women's studies
Philosophy
Religious studies
History
Design
Speech/drama
Film arts
Music
Art history/fine arts
Fine and performing arts: Other

Biological/interdisciplinary sciences
Biological science: Zoology
Biological science: Botany
Biological science: Biochemistry
Biophysics
Biological science: Other
Interdisciplinary: Environmental studies
Interdisciplinary: Biopsychology
Interdisciplinary: Integrated/general

Mathematics/physical sciences
Mathematics: Statistics
Mathematics: NOT statistics
Physical science: Chemistry
Physical science: Earth science
Physical science: Physics
Physical science: NOT chemistry/physics/earth science

Social sciences
Psychology
Anthropology/archaeology
Economics
Geography
Sociology
Political science
International relations
City planning

Other
Agriculture
Agricultural science
Natural resources
Forestry
Textiles
Home economics: Other
Vocational home economics guidance
Law: Paralegal, includes pre-law
Law
Library/archival science
Military science
Interdisciplinary: Other
Leisure studies
Basic/personal skills
Industrial arts: Construction
Commercial art
Precision production
Transportation: Air

In addition to salary and employment status, respondents reported on various benefits offered at their April 1997 job, including health, vacation, sick leave, and retirement benefits. These benefits and graduates' reported satisfaction with various other aspects of their 1997 job, including pay, promotion opportunities, education benefits, job challenge, job security, working conditions, and co-workers, are presented here with respect to major field of study.

Of course, in addition to field of study, other factors may influence employment outcomes and earnings.[4] In particular, many studies have reported gender differences in earnings within occupations as a contributing factor (Clery, Lee, and Knapp 1998; Fitzgerald 2000; Hecker 1998; Rumberger and Thomas 1993). Thus, for several outcomes, the findings for men and women are presented separately.

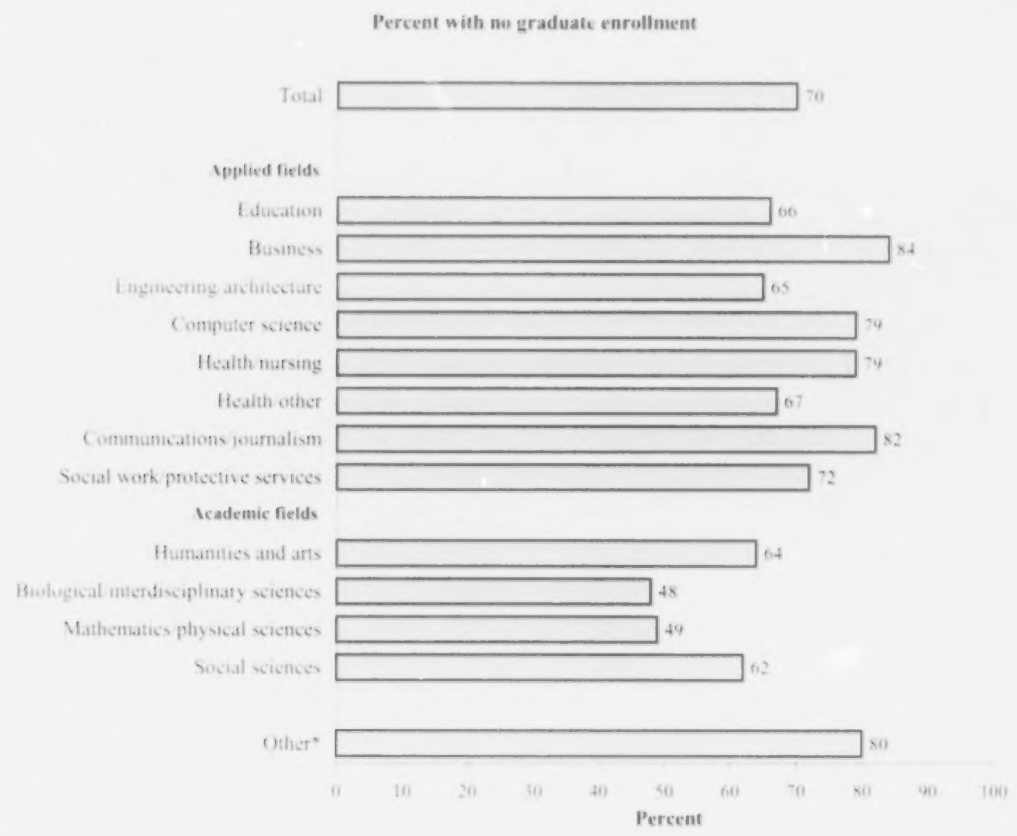
Study Sample

The study is based on 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997. College graduates who do not seek graduate education differ somewhat from those who do, especially with respect to undergraduate field of study. Since those who major in applied fields are often trained for specific occupations, they are more likely to enter the labor market immediately after graduation than are their peers who major in more academic subjects. For instance, roughly 8 in 10 of those majoring in business, nursing, computer science, and communications/journalism had not enrolled in graduate school as of 1997 (figure 1). In contrast, roughly half of 1992–93 college graduates majoring in either biological-related sciences or mathematics and physical sciences, and about three-fifths of social science majors, had not enrolled in graduate school.

Bachelor's degree recipients who did not enroll in graduate education also differed with respect to their demographic characteristics (table 1). Because older students may have family and financial obligations that make it more difficult to attend graduate school, those who were older than the traditional age at the time of their bachelor's degree (i.e., 23 years or older) were more likely not to enroll in graduate school and thus, more likely to be included in the study sample. Consistent with their older ages, married graduates were more likely not to enroll in graduate school.

[4] Even within field of study, course taking may also vary and possibly affect employment outcomes. See for example, the difference between men's and women's biological science course taking in Adelman (1991, p. 12).

Figure 1—Percentage of 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, by major field of study



*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Whether or not college graduates' parents had attained a graduate degree also was related to students' enrollment in graduate school. College graduates whose parents had attained no more than a bachelor's degree were more likely not to enroll in graduate school than their peers whose parents had earned an advanced degree.

Finally, as measured by cumulative grade point average (GPA), differences in academic performance also emerged. As undergraduate GPA declined, so the likelihood of not enrolling in

Table 1—The study sample: percentage of 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997

	No graduate enrollment
Total	70.4
Bachelor's degree major	
Applied fields	
Education	65.8
Business	84.1
Engineering/architecture	65.4
Computer science	79.4
Health/nursing	79.2
Health/other	67.1
Communications/journalism	81.5
Academic fields	
Social work/protective services	72.1
Humanities and arts	64.3
Biological/interdisciplinary sciences	47.7
Mathematics/physical sciences	48.6
Social sciences	61.6
Other*	79.7
Gender	
Male	70.5
Female	70.3
Race/ethnicity	
American Indian/Alaskan Native	79.4
Asian/Pacific Islander	69.0
Black, non-Hispanic	68.8
Hispanic	67.6
White, non-Hispanic	70.7
Age at bachelor's degree	
22 or younger	63.4
23–24	77.5
25–29	78.2
30 or older	73.9
Parents' highest level of education	
High school or less	75.5
Some postsecondary education	73.2
Bachelor's degree	70.9
Advanced degree	61.4
Marital status in 1997	
Never married	66.7
Married/cohabit as married	73.6
Divorced/separated/widowed	70.4

Table 1—The study sample: percentage of 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	No graduate enrollment
Undergraduate GPA	
Less than 3.0	80.9
3.0 to 3.49	73.6
3.5 or higher	62.0
Institution type	
Public	
Doctorate	69.8
Nondoctorate	75.1
Private, not-for-profit	
Doctorate	62.6
Nondoctorate	70.6
Private, for profit	75.1

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

graduate school increased (e.g., 19 percent with GPAs under 3.0 had enrolled, compared with 38 percent with GPAs of 3.5 or higher).

Methods

Two types of descriptive analyses are presented in the report. The first two sections ("Major Field of Study" and "Labor Market Outcomes") examine the relationship between major field of study and employment outcomes by comparing graduates in one field of study to all graduates. In this way, the experiences of graduates in specific fields are compared to the "average experience." Since the two groups being compared are not independent (i.e., graduates in each major are also part of the whole), proper statistical techniques were used to take this into account (see appendix B). In all the tables supporting discussions of specific majors compared with all graduates, estimates significantly greater than the average (i.e. the total line of the table) are shaded in gray. Estimates significantly less than the average are in a box without shading.

The third section of the report presents a multivariate analysis, in which business, the largest undergraduate field of study, was used as the base comparison group against which each other field is compared. The models controlled for demographic characteristics, college attended and GPA, and work experience.

Major Field of Study

Among 1992–93 bachelor's degree recipients who did not enroll in graduate school, more than one-quarter (28 percent) had majored in a business-related field (table 2). Following business, the next most popular majors were social sciences and humanities and arts: 15 percent and 13 percent, respectively, of college graduates with no graduate education had obtained bachelor's degrees in these fields.

Several demographic differences were apparent for graduates who had majored in applied fields, but with the exception of gender, there were few differences among those who had majored in fields considered to be more academic (women were more likely than men to major in the humanities and arts).[5]

Among the applied fields, men were more likely to major in more quantitative and technical fields, while women tended to major in fields associated with helping professions. Specifically, men were more likely to major in business (32 versus 24 percent), engineering (13 versus 2 percent), and computer science (4 versus 2 percent), while women were more likely to major in education (13 versus 4 percent), nursing (6 versus 1 percent), and other health fields (4 versus 2 percent).

Business fields tended to attract older college graduates. More than one-third of college graduates who were 30 or older when receiving the bachelor's degree had majored in business (35 percent), compared with just over one-quarter (27 percent) of those 22 or younger. College graduates in their mid-20s (ages 23–29) majored in engineering at higher rates than did their younger or older counterparts.[6]

Some racial/ethnic group differences were also found, especially with respect to engineering majors. Asian/Pacific Islander graduates were more likely than their black, non-Hispanic counterparts to major in engineering (13 versus 5 percent). However, despite what appear to be substantial differences between Asian graduates (13 percent) and graduates from other racial/ethnic groups (5 to 7 percent), there was not enough statistical evidence to conclude that they

[5]This was especially true for the field of psychology, in which nearly three-quarters of majors are women (B&B:94/97 Data Analysis System).

[6]This may be partly due to the fact that some engineering programs require five years of study; thus, students entering at age 18 would be about 23 at graduation.

Table 2—Percentage distribution of major field of study for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997

	Applied fields								Academic fields				
	Education	Business	Engineering/ architecture	Computer science	Health/ nursing	Health other	Communications/ journalism	Social work/ protective services	Humanities and arts	Biological/ interdisciplinary sciences	Mathematics/ physical sciences	Social sciences	Other*
Total	8.5	27.9	6.9	2.8	3.5	3.3	6.3	2.3	12.9	3.8	2.3	14.7	4.8
Gender													
Male	3.7	32.4	12.7	3.9	0.5	2.1	6.0	1.9	11.4	3.5	2.7	14.3	5.0
Female	12.5	24.2	2.1	1.9	6.1	4.4	6.5	2.6	14.2	4.1	2.0	15.0	4.7
Race/ethnicity													
American Indian/Alaskan Native	4.0	20.1	4.9	8.7	3.8	4.8	2.2	1.7	17.2	1.9	1.9	17.6	11.2
Asian/Pacific Islander	1.8	36.0	12.7	6.3	3.0	4.0	3.3	0.9	8.3	5.3	3.0	13.0	2.5
Black, non-Hispanic	3.7	30.8	4.5	4.1	5.0	2.5	5.9	3.5	13.4	4.6	1.0	18.9	2.0
Hispanic	10.7	22.4	6.0	3.6	3.7	4.1	5.1	3.9	13.5	3.6	1.5	16.4	5.6
White, non-Hispanic	9.1	27.6	6.9	2.5	3.5	3.3	6.6	2.2	13.0	3.7	2.4	14.3	5.0
Age at bachelor's degree													
22 or younger	7.5	26.9	5.3	2.3	1.9	2.3	8.5	1.9	14.8	4.2	2.6	17.0	4.8
23–24	8.4	23.2	9.9	2.6	2.8	3.4	7.2	2.7	12.4	3.4	2.3	15.1	6.6
25–29	8.9	30.4	8.9	4.1	3.9	3.5	3.4	1.8	10.0	5.2	2.1	13.2	4.7
30 or older	10.6	35.3	4.8	3.5	8.1	5.6	2.0	2.8	11.5	2.4	1.6	9.8	2.1
Parents' highest level of education													
High school or less	10.8	31.9	5.7	2.8	4.6	3.5	4.8	2.8	9.9	3.2	2.1	13.9	4.2
Some postsecondary education	7.4	29.8	6.8	2.5	3.9	3.7	5.5	2.6	12.6	3.1	2.0	13.9	6.1
Bachelor's degree	7.4	26.3	8.8	2.8	3.3	3.4	7.9	2.0	13.4	3.8	2.3	13.4	5.4
Advanced degree	7.5	21.1	7.5	2.9	2.2	2.7	7.5	1.2	17.9	5.3	3.0	17.2	4.1
Marital status in 1997													
Never married	5.0	26.3	7.2	3.0	1.7	2.5	8.8	2.2	15.5	4.2	2.6	17.1	4.2
Married/cohabit as married	11.1	29.1	7.0	2.8	4.6	3.7	4.6	2.2	10.9	3.4	2.2	13.0	5.5
Divorced/separated/widowed	9.9	28.8	3.4	1.9	6.7	5.6	3.9	4.0	14.2	4.6	0.9	13.0	3.2

Table 2—Percentage distribution of major field of study for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	Applied fields								Academic fields				
	Education	Business	Engineering/ architecture	Computer science	Health nursing	Health other	Communications/ journalism	Social work/ protective services	Humanities and arts	Biological/ interdisciplinary sciences	Mathematics/ physical sciences	Social sciences	Other*
Undergraduate GPA													
Less than 3.0	4.5	29.6	9.8	2.7	2.7	2.4	6.8	2.2	10.5	4.8	2.5	16.4	5.1
3.0 to 3.49	6.8	28.9	7.6	2.6	3.4	2.7	7.5	2.0	11.4	3.9	2.6	15.4	5.2
3.5 or higher	12.6	27.2	4.6	2.8	4.4	4.5	4.8	2.6	15.4	3.0	1.9	12.3	4.0
Institution type													
Public													
Doctorate	7.9	22.7	10.3	2.6	4.2	4.4	7.2	1.5	12.1	4.0	2.5	14.8	6.1
Nondoctorate	12.3	28.2	4.2	3.3	2.9	2.4	5.2	3.6	11.7	4.3	2.9	13.3	5.7
Private, not-for-profit													
Doctorate	5.3	24.5	8.6	1.7	2.4	2.6	8.9	1.5	18.6	3.2	1.8	19.8	1.3
Nondoctorate	7.9	39.1	1.5	3.4	3.8	2.5	4.3	3.2	13.5	3.1	1.7	13.5	2.8
Private, for profit	2.4	51.1	7.8	2.7	3.3	4.7	2.6	0.3	5.6	3.5	1.0	8.4	6.6

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation

NOTE: Details may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System

were more or less likely than Hispanic, white, or American Indian/Alaskan Native students to study engineering. However, if one looks at all bachelor's degrees conferred in the 1992–93 academic year using the Integrated Postsecondary Education Data System (IPEDS), definite differences were reported: Asian graduates were more likely, and black graduates less likely than others to complete engineering degrees. In addition, black graduates were less likely to earn degrees in education or health (U.S. Department of Education 1995).[7]

Finally, undergraduate major was related to the type of college or university attended. For those who did not enroll in graduate school, bachelor's degree recipients who attended public institutions that do not grant doctorate degrees were more likely than those in all other institutions to major in education (12 versus 2 to 8 percent) (table 2). In contrast, those who attended comparable private, not-for-profit institutions were more likely than others to major in business (40 versus 23 to 28 percent).

[7] However, IPEDS estimates also include those who earned bachelor's degrees and subsequently enrolled in graduate education.

Labor Market Outcomes

Employment Status in 1994 and 1997

1992–93 college graduates entered a labor market at the start of an economic recovery following a recession lasting from 1990 through March 1991 (Mishel and Bernstein 1994, p. 13). In 1997, three years after college graduates' first entry into the labor market in 1994, the economy was strong and labor market tight. By 1997, just 2 percent of college graduates who had not enrolled in graduate school were unemployed and 86 percent worked full time. However, there were some differences in employment status when taking field of study into account. In both 1994 and 1997, graduates who had majored in business, engineering, or computer science were more likely than all college graduates to be employed full time, while those with humanities and arts majors were less likely to be so (table 3a). In 1994, but not 1997, those who majored in education were less likely than all graduates to work full time and more likely to work part time, and those who majored in biological sciences also were less likely to work full time.

Demographic differences, especially gender differences, were related to employment status. Consistent with traditional gender roles, where women more often work in the home and men outside the home, women were less likely to be employed full time in both 1994 and 1997, and they more often worked part time, or were out of the labor force.

When considering race/ethnicity, few measurable differences were found to be related to how much graduates worked.[8] In 1994, but not 1997, white, non-Hispanic graduates were more likely than Hispanic graduates to work full time. Even though it appears as though Asian/Pacific Islanders were more likely to work full-time in 1994 than Hispanics, there is not enough statistical evidence to draw this conclusion. In 1997, black, non-Hispanic graduates were more likely to work full time (92 percent) than their white, non-Hispanic counterparts (86 percent).

Unemployment

In April 1994, there were no measurable differences in graduates' unemployment rates with respect to field of study when compared with all graduates as a whole. However, three years

[8]Readers should bear in mind that the sample of minority racial/ethnic groups while representative are relatively small. Therefore, some estimates that look different may not be statistically significant.

Table 3a—Percentage distributions of employment status in 1994 and 1997 for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997

	Employment status April 1994				Employment status April 1997			
	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force
Total	80.5	11.0	4.5	4.0	86.1	6.6	2.1	5.2
Bachelor's degree major								
Applied fields								
Education	72.8	21.4	2.9	2.9	82.2	9.7	1.7	6.4
Business	89.5	5.3	3.1	2.1	90.7	3.6	1.6	4.1
Engineering/architecture	87.1	5.1	7.0	0.8	95.4	1.6	1.1	1.9
Computer science	88.3	4.8	5.3	1.7	95.9	2.8	0.5	0.9
Health/nursing	81.8	13.1	2.9	2.3	73.5	18.3	1.2	6.9
Health/other	77.0	11.8	5.8	5.3	82.1	12.5	0.5	5.0
Communications/journalism	84.9	9.8	2.6	2.8	86.3	7.1	2.1	4.5
Social work/protective services	78.2	14.0	2.6	5.3	83.4	7.2	3.1	6.4
Academic fields								
Humanities and arts	73.0	15.3	5.9	5.8	78.7	11.1	4.1	6.1
Biological/interdisciplinary sciences	65.5	14.8	9.2	10.5	80.6	9.4	1.8	8.2
Mathematics/physical sciences	73.6	15.5	4.5	6.4	88.5	3.8	2.8	4.9
Social sciences	78.8	10.5	5.4	5.4	84.4	6.5	2.9	6.3
Other*	78.2	11.2	6.1	4.5	84.5	8.0	1.7	5.8

Table 3a—Percentage distributions of employment status in 1994 and 1997 for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	Employment status April 1994				Employment status April 1997			
	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force
Gender								
Male	84.8	7.9	4.5	2.8	91.6	3.9	2.0	2.6
Female	76.9	13.7	4.4	5.0	81.6	8.8	2.2	7.4
Race/ethnicity								
American Indian/Alaskan Native	74.3	11.1	5.5	9.1	67.0	18.6	3.2	11.3
Asian/Pacific Islander	81.1	9.5	4.5	5.0	85.9	4.8	4.1	5.1
Black, non-Hispanic	77.1	10.8	8.6	3.5	92.2	3.0	3.1	1.7
Hispanic	71.9	11.3	10.5	6.4	83.2	7.8	2.0	7.1
White, non-Hispanic	81.3	11.2	3.8	3.7	86.1	6.8	1.9	5.3
Age at bachelor's degree								
22 or younger	81.7	11.2	3.3	3.9	88.5	5.0	1.6	4.9
23–24	82.4	10.5	4.2	2.9	86.9	5.6	2.7	4.7
25–29	79.5	11.0	5.9	3.6	84.4	8.3	2.8	4.5
30 or older	76.0	11.6	6.0	6.4	81.4	10.0	1.7	7.0
Parents' highest level of education								
High school or less	79.6	11.4	5.2	3.9	86.2	6.5	2.1	5.2
Some postsecondary education	80.0	12.6	4.4	3.0	87.7	6.4	1.5	4.5
Bachelor's degree	82.6	10.1	3.6	3.7	87.7	6.0	2.1	4.2
Advanced degree	80.1	10.0	4.7	5.2	83.1	7.6	2.7	6.7
Marital status in 1997								
Never married	79.8	12.0	5.0	3.2	89.1	5.2	2.6	3.1
Married/cohabit as married	81.6	10.3	3.9	4.3	83.7	7.6	1.7	7.1
Divorced/separated/widowed	75.3	11.5	5.8	7.4	87.0	6.7	2.5	3.8

Table 3a—Percentage distributions of employment status in 1994 and 1997 for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	Employment status April 1994				Employment status April 1997			
	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force	Full-time employment	Part-time employment	Unemployed (includes with and without benefits)	Out of labor force
Undergraduate GPA								
Less than 3.0	81.1	10.0	5.7	3.2	87.9	4.3	3.6	4.1
3.0 to 3.49	82.1	10.4	4.1	3.4	86.8	6.5	2.2	4.6
3.5 or higher	79.3	11.8	3.7	5.1	85.0	7.3	1.4	6.3
Institution type								
Public								
Doctorate	83.5	8.6	4.6	3.4	87.2	6.5	2.0	4.4
Nondoctorate	75.5	14.8	5.7	4.1	85.3	6.9	2.3	5.4
Private, not-for-profit								
Doctorate	82.9	9.9	2.0	5.2	85.2	5.9	1.8	7.0
Nondoctorate	80.3	11.2	4.1	4.4	85.4	7.3	2.5	4.9
Private, for profit	73.8	16.7	4.8	4.8	85.2	4.2	1.5	9.1

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding. Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

later, in April 1997, graduates who had majored in computer science or health fields other than nursing had lower unemployment rates than all graduates (0.5 versus 2.1 percent) (table 3a).

Examining the number of spells of unemployment between the time of bachelor's degree (1992–93) and four years later in 1997, education majors were more likely and nursing majors less likely than all graduates to report any spells of unemployment. Among those with any unemployment, the average number of unemployment spells was 1.3 (table 3b). Only those who had majored in nursing or business reported fewer average unemployment spells than did all graduates (1.1 and 1.2, respectively). However, there were no measurable differences across fields in the average duration of unemployment spells. For those who reported any unemployment, the range was from 6 to 9 months.

Employment Stability

Under the assumption that having fewer jobs implies greater job stability, which may or may not be true in today's labor market, those who had majored in nursing, business, computer science, and engineering, experienced greater job stability. That is, they had worked in fewer jobs than all graduates as a whole since earning their bachelor's degrees (1.6 to 1.9 versus 2.3) (table 3c). In contrast, those who had majored in education, communications/journalism, or humanities and arts reported more jobs, on average (2.6, 2.8, and 2.9, respectively), than all graduates (2.3).

Correspondingly, similar patterns emerged when examining the length of time graduates had worked in their April 1997 job. Looking at all 1992–93 college graduates, the average time spent in these jobs was just over two years (28 months, of a maximum of 52 months). When comparing the duration of the April 1997 job across fields of study, those with degrees in nursing, engineering, or business had worked longer than all graduates (33, 32, and 30 months, respectively). Graduates with degrees in humanities and arts, biological sciences, or social sciences, on the other hand, had worked fewer months (24, 24 and 25 months, respectively, versus 28 months). Nevertheless, majors in these three fields still had worked in their April 1997 occupations for an average of two years.

Full-Time Salaries in 1994 and 1997

As noted earlier, the economy was growing when the 1992–93 college graduates entered the job market. While most graduates were working full time in both 1994 and 1997, their salaries and, to a lesser extent, benefits differed according to undergraduate field of study. In both 1994 and 1997, college graduates with no graduate education who had majored in business, engineering, nursing and other health fields earned higher than average full-time salaries (table 4a).

Table 3b—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage who experienced any unemployment spells between graduating from college and 1997, and among those who did, the average number of spells and the average total number of months unemployed

	Any unemployment spells	Average number of spells	Average number of months unemployed
Total	39.5	1.3	6.8
Bachelor's degree major			
Applied fields			
Education	51.7	1.4	6.1
Business	33.1	1.2	6.1
Engineering/architecture	40.6	1.3	6.6
Computer science	39.4	1.2	7.4
Health/nursing	19.0	1.1	6.0
Health/other	30.0	1.3	6.3
Communications/journalism	47.3	1.3	6.1
Social work/protective services	36.6	1.4	7.1
Academic fields			
Humanities and arts	46.5	1.4	7.5
Biological/interdisciplinary sciences	48.8	1.3	8.5
Mathematics/physical sciences	42.9	1.3	7.4
Social sciences	41.9	1.4	7.1
Other*	34.8	1.4	6.0
Gender			
Male	40.4	1.3	6.7
Female	38.7	1.3	6.8
Race/ethnicity			
American Indian/Alaskan Native	35.5		
Asian/Pacific Islander	40.6	1.2	7.0
Black, non-Hispanic	43.8	1.3	8.2
Hispanic	44.7	1.4	9.5
White, non-Hispanic	38.9	1.3	6.4
Age at bachelor's degree			
22 or younger	42.6	1.3	6.0
23–24	41.6	1.3	6.4
25–29	38.0	1.4	7.7
30 or older	29.9	1.3	9.1
Parents' highest level of education			
High school or less	40.0	1.3	7.4
Some postsecondary education	36.7	1.3	6.9
Bachelor's degree	38.2	1.3	6.4
Advanced degree	43.4	1.3	6.3

Table 3b—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage who experienced any unemployment spells between graduating from college and 1997, and among those who did, the average number of spells and the average total number of months unemployed—Continued

	Any unemployment spells	Average number of spells	Average number of months unemployed
Marital status in 1997			
Never married	44.2	1.4	7.0
Married/cohabit as married	36.0	1.3	6.4
Divorced/separated/widowed	37.7	1.4	7.9
Undergraduate GPA			
Less than 3.0	44.6	1.4	6.8
3.0 to 3.49	38.4	1.3	7.0
3.5 or higher	38.6	1.3	6.3
Institution type			
Public			
Doctorate	39.7	1.3	6.3
Nondoctorate	41.5	1.4	7.5
Private, not-for-profit			
Doctorate	40.6	1.3	6.0
Nondoctorate	37.5	1.3	7.0
Private, for profit	29.8	1.4	8.0

‡ Too few cases for a reliable estimate.

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93-97), Data Analysis System.

In contrast, those who had majored in education, social work/protective services, or humanities and arts earned lower than average salaries.

Some findings were specific to one point in time. For example, in 1997, but not in 1994, computer science majors earned a higher salary than all graduates. Correspondingly, these graduates experienced a substantially higher percent increase in average salary, compared with all graduates who worked full time in both years. In 1994, but not in 1997, communications/journalism majors earned lower than average salaries and thus, had higher than average salary increases between 1994 and 1997.

Also, there were gender differences in average salaries among 1992–93 bachelor's degree recipients employed full time. In both 1994 and 1997, men earned higher average salaries than

Table 3c—The average number of jobs begun since graduation and the average number of months worked at April 1997 job among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997

	Average number of jobs begun since graduation	Number of months worked at April 1997 job[1]
Total	2.3	27.5
Bachelor's degree major		
Applied fields		
Education	2.6	28.1
Business	1.9	29.9
Engineering/architecture	1.8	32.0
Computer science	1.9	29.6
Health/nursing	1.6	32.8
Health/other	1.9	30.9
Communications/journalism	2.8	24.3
Social work/protective services	2.2	29.3
Academic fields		
Humanities and arts	2.9	23.9
Biological/interdisciplinary sciences	2.5	25.3
Mathematics/physical sciences	2.5	27.5
Social sciences	2.5	25.2
Other[2]	2.3	25.9
Gender		
Male	2.2	28.4
Female	2.4	26.8
Race/ethnicity		
American Indian/Alaskan Native	2.0	25.7
Asian/Pacific Islander	1.8	26.0
Black, non-Hispanic	2.3	29.1
Hispanic	2.1	26.7
White, non-Hispanic	2.3	27.6
Age at bachelor's degree		
22 or younger	2.7	25.2
23–24	2.4	26.8
25–29	2.0	28.1
30 or older	1.4	34.2
Parents' highest level of education		
High school or less	2.1	29.0
Some postsecondary education	2.2	27.3
Bachelor's degree	2.4	27.2
Advanced degree	2.6	25.3

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Table 3c—The average number of jobs begun since graduation and the average number of months worked at April 1997 job among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	Average number of jobs begun since graduation	Number of months worked at April 1997 job[1]
Marital status in 1997		
Never married	2.7	25.3
Married/cohabit as married	2.0	29.3
Divorced/separated/widowed	2.2	27.9
Undergraduate GPA		
Less than 3.0	2.5	27.4
3.0 to 3.49	2.3	27.3
3.5 or higher	2.2	28.0
Institution Type		
Public		
Doctorate	2.3	27.4
Nondoctorate	2.3	27.1
Private, not-for-profit		
Doctorate	2.3	27.2
Nondoctorate	2.2	28.7
Private, for profit	1.9	27.5

[1]Maximum possible is 52 months. Dates were bounded between 1/1/93 and 4/30/97.

[2]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding. Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

women (table 4b) and men experienced a higher percent increase, overall, in salary between 1994 and 1997. When examining the gender difference in the percent increase in salary by undergraduate major, however, with one exception, there was not enough statistical evidence to conclude that men experienced a higher increase. The one exception was for majors in social work and protective services, where men reported a 28 percent increase in salary, compared with an 18 percent increase for women.

In 1994, men earned higher salaries than women among those who had majored in business, computer science, communications/journalism, and social sciences. Among graduates majoring in education, social work, biological sciences, and mathematics and physical sciences, 1994 salaries for men and women were not measurably different. However, three years

Table 4a—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, the average annual salary in April 1994 (in 1997 dollars) and 1997 and the average percentage increase between 1994 and 1997 among those working full time

	1994 full-time salary in 1997 dollars	1997 full-time salary	If full time in both 1994 and 1997, percent increase in salary
Total	$26,464	$34,310	24.5
Bachelor's degree major			
Applied fields			
Education	20,443	24,543	18.2
Business	29,017	37,448	25.1
Engineering/architecture	32,217	42,931	25.2
Computer science	29,428	44,624	31.2
Health/nursing	34,194	37,012	10.9
Health/other	35,515	42,066	17.2
Communications/journalism	22,170	32,294	28.7
Social work/protective services	21,328	27,350	21.7
Academic fields			
Humanities and arts	22,359	29,630	25.6
Biological/interdisciplinary sciences	25,380	28,760	22.4
Mathematics/physical sciences	25,958	31,565	23.6
Social sciences	23,166	33,463	26.8
Other*	24,694	33,374	23.4
Gender			
Male	28,531	38,415	26.3
Female	24,603	30,596	22.9
Race/ethnicity			
American Indian/Alaskan Native	26,819		
Asian/Pacific Islander	26,939	39,442	26.4
Black, non-Hispanic	25,053	30,583	21.6
Hispanic	25,711	32,081	21.1
White, non-Hispanic	26,574	34,424	24.8
Age at bachelor's degree			
22 or younger	24,339	32,841	26.9
23–24	24,276	33,757	26.7
25–29	27,703	35,946	22.9
30 or older	34,683	37,886	16.0
Parents' highest level of education			
High school or less	27,076	33,680	23.1
Some postsecondary education	26,556	33,703	23.0
Bachelor's degree	26,218	35,164	25.9
Advanced degree	25,304	34,652	26.7

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Table 4a—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, the average annual salary in April 1994 (in 1997 dollars) and 1997 and the average percentage increase between 1994 and 1997 among those working full time—Continued

	1994 full-time salary in 1997 dollars	1997 full-time salary	If full time in both 1994 and 1997, percent increase in salary
Marital status in 1997			
Never married	$24,236	$33,136	26.6
Married/cohabit as married	28,020	35,274	23.3
Divorced/separated/widowed	28,020	34,784	21.0
Undergraduate GPA			
Less than 3.0	25,017	32,337	25.9
3.0 to 3.49	25,782	34,634	25.1
3.5 or higher	28,222	35,624	23.5
Institution type			
Public			
Doctorate	26,252	34,455	24.7
Nondoctorate	24,694	32,201	25.2
Private, not-for-profit			
Doctorate	27,729	38,962	27.0
Nondoctorate	28,742	33,811	20.9
Private, for profit	24,502	33,683	29.5

‡ Too few cases for a reliable estimate.

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

later, in 1997, men earned higher salaries in these fields than women. In 1997, men and women earned comparable salaries only among those who had majored in engineering, health fields other than nursing, or humanities and arts.

Salary Distribution

In addition to looking at average salaries, it is informative to examine both ends of the salary distribution. For this analysis, the low end of the salary distribution was set at less than $25,000 and the high end at $50,000 or more. In 1994, college graduates who had majored in education were more likely than all graduates as a whole to earn a full-time annual salary of less than $25,000 (table 5). The same was true for majors in communications/journalism, humanities and arts, biology, and social sciences. Looking at high-end salaries, those majoring in health

Table 4b—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, the average annual salary in April 1994 (in 1997 dollars) and 1997 and the average percentage increase between 1994 and 1997 among those working full time, by gender

	1994 full-time salary in 1997 dollars		1997 full-time salary		If full time in both 1994 and 1997, percent increase in salary	
	Males	Females	Males	Females	Males	Females
Total	$28,531	$24,603[1]	$38,415	$30,596[1]	26.3	22.9[1]
Bachelor's degree major						
Applied fields						
Education	22,642	19,742	28,421	23,284[1]	21.6	17.0
Business	31,061	26,613[1]	41,436	32,908[1]	26.3	23.8
Engineering/architecture	32,460	30,964	42,952	42,822	25.1	25.5
Computer science	31,602	24,877[1]	47,697	38,881[1]	29.8	34.3
Health/nursing	—	34,257	—	36,932	—	10.2
Health/other	36,792	34,916	45,241	40,520	14.9	18.5
Communications/journalism	24,289	20,620[1]	36,947	28,934[1]	31.0	27.2
Academic fields						
Social work/protective services	22,173	20,837	29,800	25,552[1]	28.2	18.2[1]
Humanities and arts	23,489	21,541	31,495	28,362	26.4	25.1
Biological/interdisciplinary science	25,516	25,273	31,443	26,800[1]	23.2	21.8
Mathematics/physical sciences	28,103	23,866	33,636	28,741[1]	21.4	26.4
Social sciences	25,409	21,238[1]	37,454	29,809[1]	27.1	26.5
Other[2]	26,212	23,142[1]	36,593	30,297[1]	25.1	21.5
Race/ethnicity						
American Indian/Alaskan Native	—	—	—	—	—	—
Asian/Pacific Islander	26,770	27,191	39,826	39,076	25.9	26.9
Black, non-Hispanic	25,743	24,666	32,848	29,318	21.0	21.9
Hispanic	28,893	23,569	36,335	29,390	24.0	19.4
White, non-Hispanic	28,766	24,548	38,753	30,264	26.7	22.9
Age at bachelor's degree						
22 or younger	26,858	22,620	38,172	29,268	29.4	25.2
23–24	25,922	22,201	36,994	29,521	28.3	24.7
25–29	29,042	25,821	38,234	32,266	24.3	20.4
30 or older	37,860	32,328	42,302	34,348	16.7	15.5
Parents' highest level of education						
High school or less	29,858	24,777	37,935	30,186	24.7	21.8
Some postsecondary education	28,186	25,141	36,739	31,229	24.4	21.8
Bachelor's degree	27,888	24,678	39,573	30,862	28.1	23.9
Advanced degree	27,552	23,112	39,210	30,103	28.9	24.5
Marital status in 1997						
Never married	25,658	22,776	36,090	30,156	27.7	25.4
Married/cohabit as married	30,951	25,501	40,460	30,622	25.0	21.6
Divorced/separated/widowed	28,583	27,754	39,384	32,945	27.1	18.2

Table 4b—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, the average annual salary in April 1994 (in 1997 dollars) and 1997 and the average percentage increase between 1994 and 1997 among those working full time, by gender—Continued

	1994 full-time salary in 1997 dollars		1997 full-time salary		If full time in both 1994 and 1997, percent increase in salary	
	Males	Females	Males	Females	Males	Females
Undergraduate GPA						
Less than 3.0	$26,487	$23,132	$35,798	$27,827	28.4	22.4
3.0 to 3.49	27,713	23,753	38,259	30,862	25.9	24.3
3.5 or higher	31,420	26,088	41,426	31,790	25.6	21.9
Institution type						
Public						
Doctorate	28,136	24,420	38,041	30,788	26.5	22.8
Nondoctorate	27,811	21,927	36,676	28,418	26.6	23.8
Private, not-for-profit						
Doctorate	29,412	26,175	44,574	33,693	29.4	24.8
Nondoctorate	30,667	27,387	37,245	31,345	21.8	20.2
Private, for profit	25,937	22,773	38,653	29,147	32.0	27.2

‡ Too few cases for a reliable estimate.

[1] Male average significantly higher ($p<0.05$).

[2] Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

fields other than nursing were more likely than all college graduates to earn $50,000 or more in 1994. In no other field of study were graduates significantly more likely than all graduates to earn $50,000 or more.

By 1997, humanities and arts majors and education majors were the only graduates more likely to earn less than $25,000 compared to all graduates. Education majors were also much less likely to earn $50,000 or more than all graduates, as were graduates who had majored in social work, humanities and arts, and biological science fields. On the other hand, graduates with majors in business, engineering, computer science, nursing, and other health fields were less likely than all graduates to be earning under $25,000. And, with the exception of nursing, these graduates were all more likely than all graduates to be earning salaries of $50,000 or more.

Table 5—Percentage full-time salary distributions of 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997 in April 1994 (in 1997 dollars) and April 1997

	1994 salary				1997 salary			
	Less than $25,000	$25,000 34,999	$35,000 49,999	$50,000 or more	Less than $25,000	$25,000 34,999	$35,000 49,999	$50,000 or more
Total	53.4	30.6	12.1	3.9	28.1	32.5	25.9	13.5
Bachelor's degree major								
Applied fields								
Education	80.5	18.0	1.0	0.5	59.2	34.7	3.9	2.2
Business	44.3	36.1	14.3	5.3	20.6	29.4	31.7	18.2
Engineering/architecture	20.9	38.9	37.5	2.7	6.5	18.4	50.4	24.7
Computer science	37.1	37.4	17.1	8.5	15.8	17.5	38.2	28.5
Health/nursing	10.3	52.6	31.9	5.3	6.6	31.7	51.4	10.3
Health other	27.8	24.6	30.1	17.5	9.2	27.3	32.7	30.8
Communications/journalism	73.6	18.6	6.4	1.4	32.1	39.4	17.2	11.4
Academic fields								
Social work/protective services	75.9	22.5	0.8	0.9	41.4	39.0	17.3	2.3
Humanities and arts	70.5	22.1	5.9	1.5	35.8	42.0	15.7	6.4
Biological/interdisciplinary sciences	67.2	25.9	3.6	3.4	36.4	43.2	15.9	4.4
Mathematics/physical sciences	50.6	38.2	8.2	3.1	27.3	35.9	29.5	7.3
Social sciences	66.7	24.7	6.1	2.6	32.4	34.8	20.7	12.1
Other*	55.6	35.3	7.7	1.3	31.8	31.3	23.1	13.9
Gender								
Male	42.8	36.5	15.6	5.2	21.1	28.4	30.8	19.6
Female	63.0	25.3	9.0	2.7	34.5	36.1	21.5	8.0
Race/ethnicity								
American Indian/Alaskan Native	62.1	21.7	11.7	4.5	—	—	—	—
Asian/Pacific Islander	44.7	37.6	13.4	4.3	12.8	35.4	34.4	17.4
Black, non-Hispanic	62.0	26.1	10.2	1.8	35.7	35.8	17.3	11.3
Hispanic	48.9	37.0	11.6	2.5	31.0	31.3	28.7	9.0
White, non-Hispanic	53.4	30.3	12.2	4.1	28.2	32.2	25.9	13.7
Age at bachelor's degree								
22 or younger	60.6	29.6	8.2	1.6	30.3	34.1	24.9	10.8
23–24	59.6	29.7	8.5	2.2	29.1	33.5	25.1	12.3
25–29	46.2	32.9	16.5	4.3	26.7	30.4	27.7	15.2
30 or older	30.3	32.7	24.8	12.2	22.6	28.3	27.9	21.3
Parents' highest level of education								
High school or less	52.2	29.5	13.6	4.7	28.9	33.1	24.9	13.2
Some postsecondary education	51.4	33.4	11.4	3.7	30.7	32.1	25.0	12.2
Bachelor's degree	53.9	30.8	12.4	3.0	26.2	31.1	28.0	14.8
Advanced degree	57.6	27.9	11.0	3.5	27.5	34.2	24.9	13.5

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Table 5—Percentage full-time salary distributions of 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997 in April 1994 (in 1997 dollars) and April 1997 —Continued

	1994 salary				1997 salary			
	Less than $25,000	$25,000 34,999	$35,000 49,999	$50,000 or more	Less than $25,000	$25,000 34,999	$35,000 49,999	$50,000 or more
Marital status in 1997								
Never married	58.5	31.0	8.5	2.0	29.3	34.0	25.5	11.2
Married cohabit as married	50.5	29.7	14.6	5.2	27.3	30.9	26.5	15.3
Divorced separated widowed	43.6	37.7	13.5	5.2	26.2	35.1	23.6	15.2
Undergraduate GPA								
Less than 3.0	57.8	31.2	8.1	2.9	31.2	35.1	23.5	10.2
3.0 to 3.49	53.9	31.2	11.9	3.0	27.2	32.5	26.0	14.3
3.5 or higher	49.6	30.8	14.3	5.3	25.9	30.4	28.7	15.0
Institution type								
Public								
Doctorate	52.4	31.9	11.9	3.7	26.7	32.5	28.2	12.7
Nondoctorate	58.8	31.0	8.6	1.6	32.2	36.1	21.0	10.7
Private, not-for-profit								
Doctorate	51.2	25.3	19.3	4.3	19.1	31.5	27.4	22.0
Nondoctorate	50.0	30.4	13.0	6.7	32.7	27.0	26.4	13.8
Private, for profit	55.7	31.6	7.5	5.2	25.5	37.8	23.6	13.1

Too few cases for a reliable estimate.

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding. Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

1997 Occupations

About four years after earning their degrees, for most applied fields, bachelor's degree recipients were very likely to be employed in occupations obviously related to their major. For example, because they are trained for a specific occupation, nearly all nursing majors were employed as medical professionals (96 percent), as were just over two-thirds (68 percent) of those who majored in other health fields (table 6). Likewise, three-quarters (74 percent) of education majors were employed as teachers or educators, 56 percent of business majors worked in

Table 6—Percentage distribution of 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, according to their occupation in April 1997, by major field of study

	April occupation in 1997											
	Educators	Business or management	Engineering, software engineers, architecture	Computer science	Medical professionals	Editors, writers, performers	Human/protective service professionals	Research scientists/technical	Administrative/clerical/legal support	Mechanics/laborers	Service occupations	Other occupations
Total	12.5	29.3	5.4	4.9	7.0	4.9	5.9	4.7	5.5	3.9	14.6	1.0
Bachelor's degree major												
Applied fields												
Education	73.9	7.0	0.0	0.3	2.1	1.0	1.4	1.2	4.3	2.8	5.2	0.9
Business	3.7	55.8	0.8	5.2	0.5	0.9	2.0	1.8	4.7	3.5	20.3	0.8
Engineering/architecture	1.4	7.5	59.7	6.1	1.1	1.0	0.5	9.0	1.2	7.5	3.9	1.1
Computer science	3.7	12.5	12.9	57.9	1.0	0.0	0.9	3.3	1.3	2.2	3.3	0.8
Health/nursing	0.5	2.8	0.0	0.5	96.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Health/other	7.3	7.5	0.0	0.9	68.3	0.0	3.3	3.6	2.7	0.5	6.0	0.0
Communications/journalism	4.1	22.8	0.3	2.8	0.6	23.0	1.9	3.2	5.6	2.5	33.0	0.0
Social work/protective services	6.8	10.5	0.0	0.0	2.0	0.0	59.8	0.9	10.9	1.6	6.7	0.6
Academic fields												
Humanities and arts	17.8	23.4	1.0	3.7	2.0	17.0	4.8	4.0	6.3	3.8	15.0	0.9
Biological/interdisciplinary sciences	24.6	14.6	1.5	0.8	15.2	1.7	1.5	23.6	2.3	5.2	6.2	2.6
Mathematics/physical sciences	26.2	11.5	9.0	7.3	0.8	0.6	1.7	24.0	5.8	4.0	8.4	0.7
Social sciences	8.8	31.9	0.3	1.2	3.1	2.3	16.4	3.5	9.3	3.0	17.7	2.3
Other*	8.0	32.0	1.2	1.5	3.5	5.6	8.8	5.0	5.4	12.3	15.2	1.3

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Table 6—Percentage distribution of 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, according to their occupation in April 1997, by major field of study—Continued

	April occupation in 1997											
	Educators	Business or management	Engineering software engineers architecture	Computer science	Medical professionals	Editors writers performers	Human protective service professionals	Research scientists technical	Administrative clerical legal support	Mechanics laborers	Service occupations	Other occupations
Gender												
Male	7.1	29.7	9.2	7.0	2.7	4.0	5.6	6.5	2.8	6.8	16.8	1.5
Female	17.5	29.0	2.0	3.0	10.9	5.8	6.3	3.0	7.9	1.3	12.7	0.5
Race/ethnicity												
American Indian/Alaskan Native	6.9	37.6	5.8	6.8	9.7	0.9	8.9	0.0	2.3	0.0	17.6	3.6
Asian/Pacific Islander	16.5	26.9	7.6	8.7	6.7	6.1	1.8	7.3	5.5	0.5	11.5	0.3
Black, non-Hispanic	11.7	28.0	2.0	6.0	9.4	3.3	10.1	4.1	10.2	3.9	10.8	0.6
Hispanic	16.0	30.4	5.8	4.3	8.2	5.0	11.7	2.9	5.7	1.1	7.5	1.2
White, non-Hispanic	12.2	29.4	5.6	4.7	6.7	5.0	5.5	4.7	5.0	4.2	15.5	1.0
Age at bachelor's degree												
22 or younger	11.9	32.6	4.0	4.1	4.4	7.2	4.7	3.9	6.5	3.3	16.0	1.3
23–24	13.1	25.8	7.3	4.7	5.9	3.8	6.8	5.2	4.3	4.4	17.0	1.1
25–29	10.7	27.2	7.3	6.3	8.9	3.7	5.9	5.9	4.4	4.1	14.4	1.1
30 or older	14.7	28.8	4.6	6.4	13.4	1.7	7.7	4.9	5.5	4.4	7.4	0.3
Parents' highest level of education												
High school or less	14.4	29.6	4.6	4.8	8.4	3.7	7.3	4.7	5.8	3.4	12.2	0.7
Some postsecondary education	14.8	30.7	5.0	4.0	6.9	3.8	7.2	4.6	5.0	4.5	12.5	0.6
Bachelor's degree	9.3	29.6	7.2	6.1	6.3	5.4	4.3	4.5	4.9	5.0	16.3	1.0
Advanced degree	11.9	26.7	5.4	4.7	5.8	7.5	4.2	4.9	5.8	2.9	18.4	1.6
Marital status in 1997												
Never married	8.8	31.3	4.8	5.1	4.8	6.5	5.7	5.1	6.4	3.9	16.5	0.8
Married/cohabit as married	15.3	28.0	6.2	4.8	8.0	4.0	5.6	4.4	4.6	3.8	13.8	1.1
Divorced/separated/widowed	16.2	25.9	2.7	4.5	14.5	0.9	9.5	4.4	6.7	5.1	8.0	1.4

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Table 6—Percentage distribution of 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, according to their occupation in April 1997, by major field of study—Continued

	April occupation in 1997											
	Educators	Business or management	Engineering/ software engineers/ architecture	Computer science	Medical professionals	Editors/ writers/ performers	Human protective service professionals	Research scientists/ technical	Administrative/ clerical/ legal support	Mechanics/ laborers	Service occupations	Other occupations
Undergraduate GPA												
Less than 3.0	7.2	30.9	6.3	4.3	4.9	2.4	7.1	5.6	5.3	6.3	18.2	1.1
3.0 to 3.49	11.7	29.2	5.6	5.0	6.9	5.5	5.4	4.7	5.1	3.7	16.2	0.8
3.5 or higher	15.8	30.0	4.7	5.2	8.5	5.5	5.7	4.2	5.2	2.3	11.8	1.1
Institution type												
Public												
Doctorate	11.0	28.1	7.8	5.0	8.5	4.6	5.5	4.8	4.7	3.4	15.2	0.9
Nondoctorate	17.4	29.2	3.7	4.7	5.6	3.3	7.0	4.2	5.2	4.1	14.1	0.9
Private, not-for-profit												
Doctorate	8.0	31.2	6.4	4.8	5.5	7.3	5.8	5.4	7.0	2.0	15.6	0.9
Nondoctorate	11.4	33.0	1.9	5.5	6.4	4.3	6.4	3.5	5.4	5.7	14.9	1.6
Private, for profit	17.9	20.6	3.7	2.8	5.5	13.7	1.8	9.4	11.0	5.8	6.9	0.5

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding. Zeroes may be estimates less than 0.00. Gray boxes indicate the occupations with the highest percentage of graduates for a given major (if less than 50 percent, then two or more occupations (up to 50 percent) were identified.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

business occupations, 60 percent of engineering majors in engineering, 58 percent of computer science majors in computer science, and 60 percent of social work/protective services majors in human or protective services.

Unlike other applied fields, graduates with degrees in communications/journalism were more likely than graduates in any other field of study to be employed in service occupations: fully one-third of these graduates were employed in such jobs.[9] About one in five communications/journalism majors were employed in business occupations, and the same percentage reported working as editors, writers, or performers.

For academic majors who did not enroll in graduate school, the link between undergraduate field of study and employment in 1997 was not as obvious. However, there were some clear connections. For example, nearly one-quarter of graduates majoring in biological science or mathematics and physical science fields were employed in occupations related to science, research, or technical work. And roughly the same percentage of these graduates were employed as educators. This is understandable since science and mathematics teachers often specialize in the subject matter that they teach.

Some graduates who had majored in academic fields were employed in jobs that were not obviously related to their major. For example, nearly one-fourth (23 percent) of humanities and arts majors and nearly one-third of social science majors worked in business occupations. Also, a relatively large proportion of social science majors were employed in service occupations (18 percent).

Job Requirements

College graduates were asked about their perceptions regarding the skill level required by their April 1997 job and its career potential. In particular, they reported on whether a bachelor's degree was required, whether the job had definite career potential, and whether the job built on skills from a previous job. Reports varied among graduates across undergraduate fields of study. For example, graduates who had majored in education, engineering, nursing, and other health fields were more likely than all graduates to report that a degree was required for their April 1997 job (75 to 81 percent versus 61 percent) (table 7). In contrast, those with majors in business, humanities and arts, or social sciences were less likely to report that a degree was required.

While just over one-half (55 percent) of college graduates reported that their April 1997 job had definite career potential, only education majors were less likely than all graduates to report

[9]For definition of service occupations, see entry for the variable B2AJOBR in appendix A.

Table 7—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various job attributes for the April 1997 job

	Degree required	Definite career potential	Degree required and definite career potential	Built on skills from prior job
Total	60.8	55.4	37.9	69.2
Bachelor's degree major				
Applied fields				
Education	75.3	44.8	37.1	62.9
Business	55.5	58.4	37.2	69.8
Engineering architecture	80.2	62.6	53.5	67.7
Computer science	69.0	62.6	46.0	68.3
Health nursing	75.4	56.3	43.4	83.9
Health other	81.0	53.5	46.6	71.1
Communications journalism	59.1	59.1	40.9	72.6
Academic fields				
Social work/protective services	60.0	41.4	26.5	70.7
Humanities and arts	53.6	54.0	33.4	68.7
Biological/interdisciplinary sciences	64.7	49.8	37.3	66.1
Mathematics/physical sciences	73.4	49.2	41.5	54.7
Social sciences	53.7	53.3	32.6	68.8
Other*	57.5	58.8	38.0	73.9
Gender				
Male	58.4	59.3	39.0	69.0
Female	62.9	52.1	36.9	69.4
Race/ethnicity				
American Indian/Alaskan Native	49.7	69.0	35.6	64.1
Asian/Pacific Islander	59.7	54.9	39.7	69.3
Black, non-Hispanic	53.9	44.8	26.6	72.5
Hispanic	57.2	52.8	35.0	67.0
White, non-Hispanic	61.6	56.3	38.8	69.1
Age at bachelor's degree				
22 or younger	64.6	57.0	40.5	67.7
23–24	57.9	57.1	37.1	68.0
25–29	57.5	53.0	36.5	69.4
30 or older	58.4	51.1	33.9	75.0
Parents' highest level of education				
High school or less	58.0	54.5	35.6	67.7
Some postsecondary education	64.6	55.1	40.4	68.8
Bachelor's degree	61.7	58.4	39.0	69.5
Advanced degree	61.8	54.2	38.5	70.6

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Table 7—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various job attributes for the April 1997 job—Continued

	Degree required	Definite career potential	Degree required and definite career potential	Built on skills from prior job
Marital status in 1997				
Never married	58.3	53.7	35.2	68.6
Married/cohabit as married	62.7	57.4	40.1	69.4
Divorced/separated/widowed	61.6	51.1	37.0	73.5
Undergraduate GPA				
Less than 3.0	56.0	50.3	33.6	68.0
3.0 to 3.49	58.5	58.7	38.2	67.8
3.5 or higher	66.7	56.5	41.5	72.4
Institution type				
Public				
Doctorate	64.7	57.2	40.8	68.3
Nondoctorate	60.6	54.4	37.5	70.2
Private, not-for-profit				
Doctorate	60.8	57.8	39.0	68.2
Nondoctorate	53.7	52.3	31.8	70.0
Private, for profit	52.2	49.0	33.0	72.8

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

their job had definite career potential (45 versus 55 percent). Although the same appears to be true for social work majors, there is not enough statistical evidence to draw this conclusion.

Over one-third (38 percent) of graduates reported that their April 1997 job both required a degree and had definite career potential. With two exceptions, there were no measurable differences between the reports of those with specific majors and all graduates. Engineering majors reported both job attributes more often than all graduates (54 versus 38 percent) while social science majors (33 percent) were less likely to do so.

Finally, over two-thirds (69 percent) of 1992–93 bachelor's degree recipients reported that their April 1997 job built on skills they had acquired from a previous job. There was little variation across fields for whether or not graduates believed that previous skills were required. Only those who had majored in nursing were more likely than all graduates to report this job attribute (84 percent), and in no field were college graduates significantly less likely to report the same.

Job Benefits

To get a complete picture of job compensation, job benefits that college graduates receive should be taken into account. With respect to their April 1997 job, graduates were asked whether they received health insurance, paid sick leave, paid vacation, retirement, family leave, and job training outside the job (table 8). Engineering and computer science majors were more likely than all graduates to report all benefits with two exceptions: engineering majors were not more likely to get paid sick leave and computer science majors were not more likely to get outside job training. In contrast, humanities and arts majors were less likely than all graduates to report having any of the benefits. Nursing majors were more likely than all graduates to report that their April 1997 job provided retirement benefits, while those majoring in mathematics or physical sciences were more likely to report that their job provided family leave benefits. Nursing graduates also reported having outside job training more often than all graduates, while humanities and arts majors were less likely to report the same.

Job Satisfaction

Graduates reported on the level of satisfaction they experienced with pay, job security, job challenge, fringe benefits, promotion opportunity, co-workers, and working conditions in their April 1997 job. There were few differences across fields of study (table 9). Consistent with their higher than average salaries, both engineering and health majors (other than nursing) were more likely than all graduates to report high satisfaction with their rate of pay, while education and humanities and arts majors were less likely to do so.[10] Education was the only field in which majors were more likely than average to report being very satisfied with the challenge that their jobs offered, while engineering was the only field in which majors were more likely than average to report high satisfaction with co-workers. Computer science was the only field in which majors were more likely than all graduates to report being very satisfied with working conditions, while nursing majors were less likely than all graduates to report the same.

Satisfaction with their April 1997 job also varied with graduates' demographic and academic characteristics. Women were less likely than men to report being very satisfied with opportunities for promotion at their job. College graduates with a GPA less than 3.0 were less likely to report being very satisfied with the challenge of their job than graduates with a GPA of 3.0 or higher.

[10]While it appears that biological science majors also were less likely to report satisfaction with pay, there is not enough statistical evidence to draw this conclusion.

Table 8—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various benefits offered at their April 1997 job

	Health insurance	Paid sick leave	Paid vacation	Retirement	Family leave	Job training outside the job
Total	85.9	83.0	86.1	78.0	66.1	43.8
Bachelor's degree major						
Applied fields						
Education	81.4	83.3	74.6	77.8	60.3	44.0
Business	90.1	84.5	91.2	81.1	67.3	47.2
Engineering/architecture	93.2	85.0	94.7	85.9	73.9	54.2
Computer science	94.8	91.5	95.4	87.9	79.7	48.2
Health/nursing	87.5	87.7	87.2	86.8	68.9	55.8
Health/other	88.5	84.2	88.1	82.5	73.6	42.1
Communications/journalism	83.7	80.9	84.3	77.1	65.2	38.6
Social work/protective services	83.1	84.7	87.3	76.7	64.6	40.7
Academic fields						
Humanities and arts	78.1	76.7	79.4	67.7	58.5	37.1
Biological/interdisciplinary sciences	79.7	80.7	79.8	71.9	57.3	37.8
Mathematics/physical sciences	89.5	86.5	81.4	80.6	79.8	40.7
Social sciences	85.8	82.9	85.2	76.8	66.8	43.7
Other*	84.0	77.9	80.9	74.0	63.3	42.6
Gender						
Male	88.1	82.9	87.9	79.1	64.6	43.0
Female	84.1	83.1	84.5	77.1	67.3	44.5
Race/ethnicity						
American Indian/Alaskan Native	65.9	65.5	70.3	62.8	51.5	40.7
Asian/Pacific Islander	91.7	91.6	94.6	83.7	69.3	54.5
Black, non-Hispanic	90.0	87.3	91.5	84.3	71.9	42.3
Hispanic	84.4	86.6	84.6	80.7	73.1	39.3
White, non-Hispanic	85.5	82.2	85.4	77.2	65.2	43.7
Age at bachelor's degree						
22 or younger	87.4	84.9	87.6	77.9	69.9	43.6
23–24	85.6	82.0	84.9	76.9	66.6	43.0
25–29	83.5	78.3	85.9	77.0	61.9	44.3
30 or older	85.0	84.0	84.5	81.1	59.6	45.5
Parents' highest level of education						
High school or less	86.5	84.0	86.5	79.3	66.4	46.3
Some postsecondary education	87.3	83.8	87.5	79.6	68.5	45.7
Bachelor's degree	87.1	82.2	86.3	78.2	66.3	44.0
Advanced degree	82.0	82.1	84.1	74.5	63.3	40.2

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Table 8—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various benefits offered at their April 1997 job—Continued

	Health insurance	Paid sick leave	Paid vacation	Retirement	Family leave	Job training outside the job
Marital status in 1997						
Never married	85.3	81.4	85.6	76.5	67.4	41.2
Married/cohabit as married	86.4	84.2	86.4	79.4	65.4	45.8
Divorced/separated/widowed	86.4	84.5	87.0	78.4	62.5	46.4
Undergraduate GPA						
Less than 3.0	85.0	82.1	87.5	76.8	66.3	39.8
3.0 to 3.49	86.2	81.9	86.1	78.0	66.0	44.0
3.5 or higher	87.1	85.4	85.6	79.7	66.8	47.1
Institution type						
Public						
Doctorate	86.3	84.0	85.7	78.6	68.7	45.0
Nondoctorate	85.8	83.4	86.5	78.8	65.7	45.2
Private, not-for-profit						
Doctorate granting	84.3	81.7	86.3	75.6	64.9	42.6
Nondoctorate	85.1	79.7	85.2	76.2	62.4	39.6
Private, for profit	91.8	89.9	90.9	83.9	61.5	46.7

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p<0.05$).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93-97), Data Analysis System.

Reasons for Selecting April 1997 Job

The 1992–93 college graduates were asked a range of questions about their reasons for selecting their April 1997 job. Reasons included whether the job provided interesting work, was intellectually challenging, required previous experience, and provided opportunity for advancement. Graduates also were asked whether the job offered a good starting income, income potential, and job security. Differences seemed to be related to the graduates' undergraduate field of study. With the exception of the job providing interesting work and requiring previous experience, education majors were less likely than all graduates to report choosing their job for any other reason (i.e., for income reasons, intellectual reasons, advancement opportunities, or job security; table 10). Business majors were more likely than average to report selecting their job because of advancement opportunities. But, business also was the only field in which graduates were less likely than average to report having selected their job because it provided interesting work.

Table 9—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting being very satisfied with various aspects of their April 1997 job

	Pay	Job security	Job challenge	Fringe benefits	Promotion opportunity	Co-workers	Working conditions
Total	32.6	63.0	55.8	52.8	38.3	79.6	55.6
Bachelor's degree major							
Applied fields							
Education	27.0	64.1	66.3	45.8	31.8	78.7	50.4
Business	34.3	61.5	52.7	54.3	42.1	80.0	58.5
Engineering/architecture	42.0	60.4	60.4	57.6	46.1	85.4	54.4
Computer science	40.7	62.8	59.7	65.9	43.9	78.7	69.4
Health/nursing	38.0	55.8	62.1	48.4	33.5	79.1	41.6
Health/other	48.4	70.4	63.3	54.4	27.3	75.9	51.9
Communications/journalism	30.9	63.3	54.6	60.1	42.3	81.3	56.5
Social work/protective services	33.9	66.9	60.4	53.7	33.6	76.9	48.9
Academic fields							
Humanities and arts	26.6	60.7	53.1	51.0	34.1	79.2	54.9
Biological/interdisciplinary sciences	23.9	57.6	50.8	41.5	28.1	73.4	46.4
Mathematics/physical sciences	38.1	62.5	49.9	51.5	30.5	77.7	52.7
Social sciences	29.3	66.0	52.9	50.8	36.4	79.7	53.7
Other*	34.1	69.0	59.0	50.6	44.2	82.4	59.9
Gender							
Male	33.4	62.3	54.2	52.9	41.5	79.1	56.4
Female	31.9	63.6	57.1	52.7	35.6	80.1	55.0
Race/ethnicity							
American Indian/Alaskan Native	49.9	57.5	68.2	49.0	42.2	76.1	64.7
Asian/Pacific Islander	23.4	57.3	51.6	40.6	28.2	65.7	56.2
Black, non-Hispanic	22.9	48.4	43.5	36.9	29.7	75.7	43.4
Hispanic	32.9	66.8	59.2	55.9	42.7	78.6	54.0
White, non-Hispanic	33.7	64.4	56.5	53.9	39.3	80.7	56.6
Age at bachelor's degree							
22 or younger	34.1	67.1	55.7	54.5	40.1	81.4	55.8
23–24	31.6	65.6	58.5	54.6	41.0	79.5	59.8
25–29	31.6	59.3	51.7	48.2	37.1	78.7	50.3
30 or older	30.9	52.0	55.2	49.7	30.3	75.9	53.1
Parents' highest level of education							
High school or less	34.6	61.8	58.8	52.9	37.0	80.1	56.5
Some postsecondary education	29.6	64.0	56.5	52.8	38.7	77.4	53.8
Bachelor's degree	33.7	63.9	56.1	54.9	41.4	80.5	55.8
Advanced degree	31.9	64.1	52.1	51.7	36.6	81.7	57.2

Table 9—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting being very satisfied with various aspects of their April 1997 job —Continued

	Pay	Job security	Job challenge	Fringe benefits	Promotion opportunity	Co-workers	Working conditions
Marital status in 1997							
Never married	30.8	62.5	52.4	54.0	38.6	78.7	54.8
Married/cohabit as married	34.6	63.5	58.5	52.6	38.3	80.5	56.7
Divorced/separated/widowed	27.8	61.5	55.7	46.0	35.7	78.8	53.0
Undergraduate GPA							
Less than 3.0	31.0	60.6	49.4	53.4	38.0	79.8	54.8
3.0 to 3.49	32.3	66.3	57.0	54.2	39.2	79.3	58.6
3.5 or higher	34.1	60.8	58.1	52.2	39.0	80.1	52.2
Institution type							
Public							
Doctorate	33.6	64.9	56.8	53.8	39.3	80.5	56.6
Nondoctorate	31.4	63.2	56.7	52.8	38.2	79.2	55.1
Private, not-for-profit							
Doctorate	33.1	64.6	55.4	52.4	39.3	81.4	52.2
Nondoctorate	32.2	57.4	52.4	51.2	35.5	78.5	54.6
Private, for profit	30.3	61.9	56.2	50.9	37.5	71.6	64.6

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p < 0.05$)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93-97), Data Analysis System

Nursing majors were less likely than average to report choosing their jobs because of income potential, as were those with majors in social work or protective services. Also, graduates who majored in the biological sciences were less likely to report choosing their jobs for advancement opportunities.

Three gender differences emerged with regard to the reasons that graduates selected their jobs. Women were more likely than men to have selected their April 1997 job because the work was interesting. In contrast, men more often chose their job because of advancement opportunities or income potential.

Table 10—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various reasons for taking their April 1997 job

	Interesting work	Intellectual work	Previous experience	Better advancement opportunities	Good income to start	Income potential	Job security
Total	17.2	8.9	8.2	17.2	11.6	11.1	5.5
Bachelor's degree major							
Applied fields							
Education	20.3	4.2	9.2	4.5	5.3	5.7	2.6
Business	13.5	10.1	7.6	24.3	13.2	15.0	5.5
Engineering/architecture	23.5	10.7	8.2	16.1	16.6	13.6	6.3
Computer science	19.6	8.4	7.8	18.7	14.1	10.9	5.8
Health/nursing	27.2	7.8	9.1	14.9	8.1	3.9	4.8
Health/other	26.6	9.6	10.2	16.1	17.3	9.0	6.2
Communications/journalism	14.7	8.6	8.0	19.0	13.9	8.5	5.9
Social work/protective services	27.1	8.2	10.7	14.1	8.2	4.4	7.1
Academic fields							
Humanities and arts	14.3	7.3	6.8	14.4	12.1	9.4	5.5
Biological/interdisciplinary sciences	20.7	6.3	7.9	7.7	7.4	8.9	8.9
Mathematics/physical sciences	24.9	7.6	14.5	13.3	8.5	9.5	4.5
Social sciences	15.1	8.5	9.4	18.3	11.5	12.7	6.4
Other*	18.8	5.1	9.3	17.4	8.1	9.5	4.9
Gender							
Male	13.9	7.7	7.3	19.5	13.0	13.9	5.4
Female	20.2	9.9	9.0	15.2	10.3	8.7	5.5
Race/ethnicity							
American Indian/Alaskan Native	12.9	6.8	3.5	22.9	8.3	17.3	4.6
Asian/Pacific Islander	16.5	21.1	5.9	21.1	12.1	10.3	6.8
Black, non-Hispanic	13.2	6.6	9.6	12.3	12.6	6.8	6.1
Hispanic	17.7	7.3	6.3	15.0	9.9	8.0	5.5
White, non-Hispanic	17.6	8.6	8.3	17.4	11.6	11.5	5.4
Age at bachelor's degree							
22 or younger	17.4	9.9	7.6	19.2	12.3	11.3	4.9
23–24	19.2	8.3	8.3	17.1	12.1	13.5	6.2
25–29	13.9	7.0	8.0	16.5	9.6	10.4	5.5
30 or older	16.2	8.4	9.5	13.0	9.9	7.6	5.8
Parents' highest level of education							
High school or less	16.9	8.1	9.4	15.6	11.0	10.4	6.0
Some postsecondary education	19.6	9.4	7.5	16.6	11.4	11.2	5.2
Bachelor's degree	16.3	9.5	6.6	18.7	11.4	12.3	5.9
Advanced degree	17.0	8.8	8.4	18.2	11.8	10.2	3.9

Table 10—Among 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997, percentage reporting various reasons for taking their April 1997 job—Continued

	Interesting work	Intellectual work	Previous experience	Better advancement opportunities	Good income to start	Income potential	Job security
Marital status in 1997							
Never married	17.0	10.9	8.3	19.0	11.2	13.4	5.8
Married/cohabit as married	17.3	7.0	7.9	15.9	11.9	9.3	4.8
Divorced/separated/widowed	17.9	11.4	9.9	15.8	11.4	10.1	9.4
Undergraduate GPA							
Less than 3.0	14.7	5.7	5.8	17.7	11.1	11.5	5.6
3.0 to 3.49	16.9	10.5	8.0	18.4	12.4	11.4	6.2
3.5 or higher	19.1	9.2	9.4	16.4	11.2	10.3	4.8
Institution type							
Public							
Doctorate	16.9	8.1	8.0	18.1	12.3	11.4	2.1
Nondoctorate	19.1	8.4	8.0	16.8	11.0	11.1	7.0
Private, not-for-profit							
Doctorate	17.9	10.7	7.4	17.0	11.5	12.1	4.2
Nondoctorate	15.1	8.9	9.5	15.8	10.6	9.3	5.4
Private, for profit	16.8	15.9	7.8	18.2	12.6	14.2	3.9

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation

NOTE: Gray boxes indicate majors significantly higher than average, white indicates significantly lower than average ($p < 0.05$)

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System

Multivariate Analysis: Comparing Other Majors to Business

The analysis thus far has been limited to bivariate comparisons and in particular, comparisons of graduates in specific fields of study to all graduates as a whole. While this type of analysis is useful to gain insight into the general patterns of employment outcomes with respect to major, many other factors also may play a role in how college graduates fare in the labor market. Gender and age, for example, are highly correlated with employment outcomes. In order to take multiple factors into account, it is necessary to use statistical techniques that hold related variables constant while looking at the independent effects of individual variables. To do so usually requires the use of a comparison group or in the case of this study, a particular field of study against which to compare other fields. The natural point of comparison is business, the field of study that dominates undergraduate education. As was shown in figure A, over one-quarter of all 1992–93 undergraduates had majored in a business-related field. Thus, the multivariate analysis compares specific majors to business after holding other variables constant. In other words, taking into account factors such as age, gender, marital status, employment experience, and other variables that may affect employment outcomes, the analysis compares college graduates in each major with those in business.

Three linear regression models were developed with the following outcome or dependent variables: (1) 1997 full-time salary, (2) the percent increase in full-time salaries for those who worked full time in *both* 1994 and 1997, and (3) the percentage of graduates reporting that their 1997 occupation both required a bachelor's degree and had definite career potential. Models 1 and 2 (1997 salary and percent increase in salary) were run separately for men and women. The sample for model 1 was limited to those who worked full time in 1997; model 2 included those who worked full time in both 1994 and 1997; and model 3 included all graduates (i.e. those with no graduate enrollment).

Along with undergraduate major, the independent variables included in the models reflect student demographic characteristics (gender, race/ethnicity, age at bachelor's degree, parents' highest education); family responsibilities (marital status, parenthood); performance in college (cumulative GPA); undergraduate institution attended; and work experience. Work experience variables included employment while enrolled in college, ever worked in overlapping jobs simultaneously, worked in two or more jobs since graduation, worked in one job versus two or more,

and the average number of months worked in the 1997 job. Finally, like the bivariate analysis, only bachelor's degree recipients with no graduate enrollment were included in the analysis.

The results of the first regression analysis—1997 full-time salaries—are shown in table 11a. The first column displays the unadjusted average full-time salaries of college graduates with no graduate education before controlling for the other variables. The second column displays the average salaries after controlling for all the independent variables listed in the table. In other words, they are the expected salaries after holding all other variables constant. The italicized category for each variable is the reference group against which all comparisons and tests of statistical significance are made. Asterisks indicate when a particular category of a variable is significantly different from the reference group. When asterisks appear in both columns, one can draw the same conclusion as when interpreting the unadjusted results. When asterisks appear in only one column, it means that the adjustment procedure may lead to a different interpretation than when one uses only unadjusted estimates. For example, before adjustment, the average salaries for graduates in several fields differed from those in business. After adjustment, however, only education and humanities and arts remained different from business. Graduates in either education or humanities and arts earned less than their peers in business, while graduates in no other field earned significantly more than those in business. The change between the unadjusted and adjusted salaries is likely due the interrelationship of several variables, but in particular, to age and employment experience. Older graduates were more likely to major in business (see table 2), and these graduates presumably have more employment experience, which in turn is associated with higher salaries. Thus, when age and employment experience are controlled for, the average adjusted salary for business appears lower than the unadjusted amount and the adjusted salaries for several other fields appear higher.

In addition to field of study, three other variables included in the model remained significant predictors of 1997 salaries after controlling for related variables: gender, GPA, and institution first attended. Men earned substantially more than women, graduates with GPAs under 3.0 earned less than those with GPAs of 3.5 or higher, and those attending private, not-for-profit doctorate institutions earned more than their counterparts attending comparable public institutions.

Table 11a—Average full-time salary reported in April 1997 for 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Total	$34,310	$34,310	$43,526	$3,357
Bachelor's degree major				
Education	24,543*	26,876*	-9,196	2,511
Mathematics/physical sciences	31,565*	31,076	-4,996	4,189
Social science	33,463*	33,840	-2,231	1,977
Other[5]	33,374	35,075	-997	3,805
Engineering/architecture	42,931*	39,719	3,648	2,566
Computer science	44,624*	42,866	6,795	3,652
Health/nursing	37,012	38,519	2,447	3,668
Health/other	42,006*	42,226	6,154	3,670
Communications/journalism	32,294*	33,244	-2,828	2,718
Social work/protective services	27,350*	28,682	-7,389	4,211
Humanities and arts	29,630*	30,037*	-6,034	2,119
Biological/interdisciplinary sciences	28,760*	30,230	-5,842	3,395
Business	*37,448*	*36,071*	†	†
Gender				
Female	30,596*	31,322*	-6,290	1,326
Male	*38,415*	*37,612*	†	†
Race/ethnicity				
American Indian/Alaskan Native				
Asian/Pacific Islander	39,442*	38,535	4,218	3,199
Black, non-Hispanic	30,583*	32,355	-1,962	2,622
Hispanic	32,081	32,803	-1,514	2,906
White, non-Hispanic	*34,424*	*34,317*	†	†
Age at bachelor's degree				
23–24	33,757	33,620	62	1,567
25–29	35,947*	34,641	1,083	2,065
30 or older	37,586*	37,137	3,579	2,510
22 or younger	*32,841*	*33,558*	†	†
Marital status in 1997				
Married/cohabit as married	35,226*	35,049	1,698	1,374
Not married	*33,136*	*33,351*	†	†
Children in 1997				
Yes	34,801	32,014	-2,733	2,362
No	*34,046*	*34,746*	†	†
Parents' highest level of education				
High school or some college	33,689	33,765	-1,192	1,272
Bachelor's or higher	*34,920*	*34,957*	†	†

Table 11a—Average full-time salary reported in April 1997 for 1992–93 bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	$33,383*	$33,605	-$2,318	$1,945
Part-time	33,261*	33,982	-1,942	1,741
Full-time	*37,639*	*35,923*	†	†
Overlapping jobs in 1997				
Yes	27,770*	31,223	-3,598	1,866
No	*35,392*	*34,821*	†	†
Number of jobs worked since bachelor's				
2 or more	32,467*	33,523	-2,252	1,746
1 job	*37,739*	*35,775*	†	†
Cumulative GPA				
Less than 3.0	32,338*	32,065*	-3,712	1,860
3.10–3.49	34,634	34,041	-1,736	1,404
3.5 or higher	*35,624*	*35,777*	†	†
Institution first attended				
Public, nondoctorate	32,201	33,221	-759	1,581
Private, not-for-profit nondoctorate	33,811	33,603	-377	1,795
Private, not-for-profit doctorate	38,962*	39,184*	5,205	2,036
Private, for-profit	33,683	32,686	-1,294	3,544
Public, doctorate	*34,455*	*33,980*	†	†

Too few cases for a reliable estimate.

*p<.0.05.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The estimates are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared. A control was also added for number of months worked in April 1997 job.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

When models predicting 1997 full-time salaries were run separately for men and women, GPA was no longer significant. Otherwise, the results for men mirrored those for all graduates: men who had majored in education or humanities and arts earned less than business majors and those attending private, not-for-profit institutions earned more than their counterparts attending comparable public institutions (table 11b). For women, on the other hand, there were several factors related to their 1997 salaries that were not related to men's (table 11c). Those who had majored in either engineering or other health fields reported substantially higher salaries than their peers who had majored in business. And unlike graduates as a whole and their male peers, women who had majored in humanities and arts did not earn significantly less than women who had majored business. In addition, women's age at bachelor's degree, race/ethnicity, and employment experience all independently influenced their 1997 salaries. Specifically, women age 30 or older (compared with those under 23), Asian/Pacific Islanders (compared with white graduates), and women who never worked in overlapping jobs (compared with those who did) earned higher salaries. It is not clear why so many more variables were associated with women's 1997 salary compared with men's. Whether women are subjected to greater scrutiny in advancing through their professions or whether there is more variation among women college graduates with respect to their employment tenure cannot be determined from the data.

When looking at college graduates who worked full time in *both* 1994 and 1997, after controlling for related variables, only two factors were associated with the percent increase in salaries between 1994 and 1997: age and major field of study (table 12a). College graduates age 30 or older experienced a smaller percent increase in salary than their counterparts age 22 or younger, and those who had majored in either education or nursing experienced a lower percent increase in salary than did business majors. The finding for age is consistent with the fact that college graduates age 30 or older earned substantially higher salaries in 1994 than did their counterparts age 22 or younger (see table 4a); older graduates also reported working in fewer jobs (table 3c), giving them fewer opportunities for pay increases. Similarly, nursing majors also started out at a relatively high rate of pay (i.e., their 1994 salary was higher than average). Education majors, on the other hand, started with low salaries and they remained low between 1994 and 1997.

When models for men and women were run separately, age was the only factor included in the model that predicted the average percent increase in salary for men (table 12b). Otherwise, male college graduates working full time in both 1994 and 1997 appeared to be advancing in salary at roughly the same rate regardless of major field of study, employment experiences, and variables other than age that were included in the model. For women, field of study was the only predictor of salary increases (table 12c). That is, women who were nursing majors or education majors experienced lower percent increases in salary than did women who were business majors.

Table 11b—Average full-time salary reported in April 1997 for 1992–93 male bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
		Males		
Total	$38,415	$38,415	$46,036	$5,788
Bachelor's degree major				
Education	28,421*	28,792*	-11,834	5,546
Mathematics physical sciences	33,636	34,270	-6,356	6,655
Social science	37,454	37,474	-3,152	3,384
Other	36,593	38,109	-2,517	7,929
Engineering architecture	42,952	41,938	1,312	3,540
Computer science	47,697	46,847	6,221	5,493
Health nursing	—	—	—	—
Health other	45,241	45,475	4,849	7,526
Communications journalism	36,947	37,065	-3,561	4,903
Social work protective services	29,800*	31,248	-9,378	7,757
Humanities and arts	31,495*	31,431*	-9,195	3,837
Biological interdisciplinary sciences	31,443*	33,249	-7,377	6,199
Business	*41,436*	*40,626*	†	†
Race ethnicity				
American Indian Alaskan Native	—	—	—	—
Asian Pacific Islander	39,826	39,169	492	5,458
Black, non-Hispanic	32,848	33,892	-4,785	5,162
Hispanic	36,335	37,560	-1,117	5,656
White, non-Hispanic	*38,753*	*38,677*	†	†
Age at bachelor's degree				
23–24	36,995	37,859	-651	2,669
25–29	38,234	37,882	-628	3,295
30 or older	42,302*	40,095	1,585	4,401
22 or younger	*37,580*	*38,510*	†	†
Marital status in 1997				
Married cohabit as married	40,393*	40,174	3,828	2,366
Not married	*36,090*	*36,347*	†	†
Children in 1997				
Yes	37,912	36,451	-2,251	4,279
No	*40,127*	*38,702*	†	†
Parents' highest level of education				
High school or some college	37,492	37,398	-2,112	2,198
Bachelor's or higher	*39,400*	*39,510*	†	†

Table 11b—Average full-time salary reported in April 1997 for 1992–93 male bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	$38,549	$38,208	-$1,892	$3,419
Part-time	37,011*	37,769	-2,331	2,992
Full-time	*40,933*	*40,100*	†	†
Overlapping jobs begun since bachelor's				
Yes	32,116*	35,125	-3,701	3,574
No	*39,203*	*38,827*	†	†
Number of jobs begun since bachelor's				
2 or more	36,565*	37,426	-2,698	3,010
1 job	*41,609*	*40,123*	†	†
Cumulative GPA				
Less than 3.0	35,799*	36,745	-3,660	3,156
3.10–3.49	38,259	37,929	-2,475	2,520
3.5 or higher	*41,426*	*40,404*	†	†
Institution first attended				
Public, nondoctorate	36,676	37,412	-534	2,770
Private, not-for-profit nondoctorate	37,245	36,344	-1,602	3,253
Private, not-for-profit doctorate	44,574	45,009*	7,063	3,505
Private, for-profit	38,653	37,461	-485	6,137
Public, doctorate	*38,041*	*37,946*	†	†

— Too few cases for a reliable estimate.

*p<0.05.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The estimates are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared. A control was also added for number of months worked in April 1997 job.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Table 11c—Average full-time salary reported in April 1997 for 1992–93 female bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
		Females		
Total	$30,596	$30,596	$35,164	$3,384
Bachelor's degree major				
Education	23,284*	24,661*	-6,978	2,326
Mathematics/physical sciences	28,741	29,618	-2,021	4,834
Social science	29,809	30,208	-1,431	2,102
Other	30,297	32,400	762	3,548
Engineering/architecture	42,822*	41,472*	9,834	4,433
Computer science	38,881	38,817	7,178	4,613
Health/nursing	36,931	35,527	3,888	2,990
Health/other	40,520*	39,320*	7,681	3,434
Communications/journalism	28,934	29,849	-1,789	2,752
Social work/protective services	25,552*	25,668	-5,971	4,202
Humanities and arts	28,362*	28,278	-3,360	2,153
Biological/interdisciplinary sciences	26,800*	27,815	-3,824	3,414
Business	*32,908*	*31,639*	†	†
Race/ethnicity				
American Indian/Alaskan Native				
Asian/Pacific Islander	39,076*	38,317*	7,929	3,413
Black, non-Hispanic	29,318	29,769	-619	2,509
Hispanic	29,390	28,577	-1,811	2,816
White, non-Hispanic	*30,265*	*30,389*	†	†
Age at bachelor's degree				
23–24	29,521	29,815	724	1,679
25–29	32,265*	32,027	2,937	2,429
30 or older	34,348*	34,756*	5,666	2,631
22 or younger	*29,269*	*29,090*	†	†
Marital status in 1997				
Married/cohabit as married	30,921	30,477	-288	1,457
Not married	*30,155*	*30,765*	†	†
Children in 1997				
Yes	31,646	27,837	-3,398	2,436
No	*30,412*	*31,234*	†	†
Parents' highest level of education				
High school or some college	30,574	30,403	-444	1,339
Bachelor's or higher	*30,504*	*30,847*	†	†

Table 11c—Average full-time salary reported in April 1997 for 1992–93 female bachelor's degree recipients who had not enrolled in graduate school by 1997, unadjusted and adjusted after controlling for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	$28,785*	$29,423	-$2,761	$2,062
Part-time	30,023*	30,536	-1,648	1,855
Full-time	*34,387*	*32,185*	†	†
Overlapping jobs begun since bachelor's				
Yes	25,195	27,606*	-3,602	1,812
No	*31,701*	*31,208*	†	†
Number of jobs begun since bachelor's				
2 or more	28,944*	30,017	-1,734	1,843
1 job	*33,892*	31,751	†	†
Cumulative GPA				
Less than 3.0	27,827*	27,807	-3,906	2,012
3.10–3.49	30,862	30,487	-1,226	1,433
3.5 or higher	*31,790*	*31,713*	†	†
Institution first attended				
Public, nondoctorate	28,418*	29,398	-1,116	1,651
Private, not-for-profit nondoctorate	31,345	30,894	380	1,814
Private, not-for-profit doctorate	33,693	33,743	3,229	2,146
Private, for-profit	29,147	27,607	-2,907	3,766
Public, doctorate	*30,788*	*30,514*	†	†

— Too few cases for a reliable estimate.

*p<0.05.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The estimates are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared. A control was also added for number of months worked in April 1997 job.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93-97), Data Analysis System.

Table 12a—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Total	24.6	24.6	27.2	3.92
Bachelor's degree major				
Education	18.2*	18.8*	-7.1	3.04
Mathematics physical sciences	23.6	23.2	-2.6	5.22
Social science	26.8	26.2	0.4	2.31
Other	23.4	24.7	-1.2	4.59
Engineering architecture	25.2	24.3	-1.6	2.94
Computer science	31.2	32.4	6.6	4.18
Health nursing	10.9*	13.8*	-12.1	4.32
Health other	17.2*	18.6	-7.2	4.33
Communications journalism	28.7	27.1	1.3	3.13
Social work protective services	22.2	23.2	-2.6	5.12
Humanities and arts	25.6	25.0	-0.8	2.56
Biological interdisciplinary sciences	22.4	21.0	-4.8	4.36
Business	*25.1*	*25.8*	†	†
Gender				
Female	22.9*	23.5	-2.1	1.55
Male	*26.3*	*25.6*	†	†
Race ethnicity				
American Indian Alaskan Native				
Asian Pacific Islander	26.4	24.7	-0.1	3.70
Black, non-Hispanic	21.6	22.4	-2.4	3.14
Hispanic	21.3	22.6	-2.1	3.59
White, non-Hispanic	*24.8*	*24.8*	†	†
Age at bachelor's degree				
23–24	26.6	26.3	0.3	1.85
25–29	22.9*	23.1	-3.0	2.44
30 or older	16.1*	18.7*	-7.3	3.04
22 or younger	*26.9*	*26.1*	†	†
Marital status in 1997				
Married cohabit as married	23.1*	24.5	-0.1	1.62
Not married	*26.6*	*24.6*	†	†
Children in 1997				
Yes	17.9*	25.1	0.7	2.86
No	*26.3*	*24.4*	†	†
Parents' highest level of education				
High school or some college	23.0*	24.0	-1.3	1.50
Bachelor's or higher	*26.1*	*25.2*	†	†

Table 12a—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	25.5*	25.0	1.7	2.30
Part-time	25.8*	24.9	1.6	2.03
Full-time	*20.4*	*23.3*	†	†
Overlapping jobs begun since bachelor's				
Yes	26.3	25.1	0.7	2.38
No	*24.3*	*24.5*	†	†
Number of jobs begun since bachelor's				
2 or more	26.8*	25.6	2.9	2.05
1 job	*20.8*	*22.7*	†	†
Cumulative GPA				
Less than 3.0	25.8	24.5	-0.2	2.20
3.10–3.49	25.2	24.5	-0.1	1.65
3.5 or higher	*23.5*	*24.6*	†	†
Institution first attended				
Public, nondoctorate	25.2	25.3	1.0	1.88
Private, not-for-profit nondoctorate	21.0*	22.3	-2.1	2.10
Private, not-for-profit doctorate	27.0	26.0	1.7	2.36
Private, for-profit	29.5	30.3	6.0	4.48
Public, doctorate	*24.7*	*24.3*	†	†

— Too few cases for a reliable estimate.

*$p<0.05$.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Table 12b—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 male bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
		Males		
Total	26.3	26.3	29.5	5.84
Bachelor's degree major				
Education	21.6	22.4	-5.1	5.77
Mathematics/physical sciences	21.4	22.3	-5.1	7.41
Social science	27.1	26.1	-1.4	7.47
Other[5]	25.1	29.8	2.3	8.20
Engineering/architecture	25.1	24.8	-2.7	3.56
Computer science	29.8	31.9	4.4	5.52
Health/nursing				
Health/other	14.9*	16.4	-11.0	7.26
Communications/journalism	31.0	29.4	1.9	4.97
Social work/protective services	28.2	28.8	1.4	8.23
Humanities and arts	26.4	25.7	-1.8	3.98
Biological/interdisciplinary sciences	23.2	21.7	-5.8	6.73
Business	*26.3*	*27.5*	†	†
Race/ethnicity				
American Indian/Alaskan Native				
Asian Pacific Islander	25.9	25.8	-0.9	5.46
Black, non-Hispanic	21.0*	20.8	-5.9	5.49
Hispanic	24.0	25.0	-1.7	5.87
White, non-Hispanic	*26.7*	*26.7*	†	†
Age at bachelor's degree				
23–24	28.3	28.0	-0.6	2.72
25–29	24.3	24.8	-3.7	3.39
30 or older	16.7*	18.9*	-9.7	4.47
22 or younger	*29.5*	*28.5*	†	†
Marital status in 1997				
Married/cohabit as married	25.2*	26.7	0.9	2.42
Not married	*27.2*	*25.8*	†	†
Children in 1997				
Yes	19.6*	26.8	0.6	4.31
No	*27.2*	*26.2*	†	†
Parents' highest level of education				
High school or some college	24.6*	25.2	-2.3	2.25
Bachelor's or higher	*28.5*	*27.5*	†	†

Table 12b—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 male bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	27.4	26.9	2.4	3.45
Part-time	27.9*	26.9	2.5	3.04
Full-time	*21.6*	*24.4*	†	†
Overlapping jobs in 1997				
Yes	31.1*	30.1	4.2	4.00
No	*25.8*	*25.9*	†	†
Number of jobs worked since bachelor's				
2 or more	28.7*	27.0	1.7	3.04
1 job	*22.7*	*25.3*	†	†
Cumulative GPA				
Less than 3.0	28.5	27.6	1.0	3.22
3.10–3.49	25.9	25.6	-0.9	2.56
3.5 or higher	*25.6*	*26.6*	†	†
Institution first attended				
Public, nondoctorate	26.6	26.3	-0.2	2.82
Private, not-for-profit nondoctorate	21.9*	22.9	-3.6	3.30
Private, not-for-profit doctorate	29.4	28.3	1.8	3.54
Private, for-profit	32.0	33.9	7.4	6.57
Public, doctorate	*26.5*	*26.5*	†	†

— Too few cases for a reliable estimate.

*p<0.05.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Table 12c—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 female bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
		Females		
Total	22.9	22.9	24.1	5.25
Bachelor's degree major				
Education	17.0*	16.9*	-7.7	3.73
Mathematics/physical sciences	26.4	25.3	0.7	7.77
Social science	26.5	25.9	1.3	3.27
Other[5]	21.5	21.7	-2.8	5.68
Engineering/architecture	25.4	24.5	-0.1	6.76
Computer science	34.3*	34.9	10.3	6.96
Health nursing	10.2*	12.1*	-12.5	4.59
Health other	18.4	19.4	-5.2	5.54
Communications/journalism	27.2	25.3	0.8	4.17
Social work/protective services	18.2	18.9	-5.7	6.76
Humanities and arts	25.1	24.4	-0.1	3.48
Biological/interdisciplinary sciences	21.8	20.6	-4.0	5.95
Business	*23.8*	*24.6*	†	†
Race/ethnicity				
American Indian/Alaskan Native				
Asian/Pacific Islander	26.9	23.4	0.4	5.27
Black, non-Hispanic	21.9	21.8	-1.2	3.94
Hispanic	14.4	19.7	-3.3	4.73
White, non-Hispanic	*22.9*	*23.1*	†	†
Age at bachelor's degree				
23–24	24.7	24.9	1.1	2.66
25–29	20.4	21.0	-2.8	3.83
30 or older	15.5*	18.8	-5.1	4.40
22 or younger	*25.2*	*23.8*	†	†
Marital status in 1997				
Married/cohabit as married	21.1*	22.4	-1.3	2.29
Not married	*25.4*	*23.7*	†	†
Children in 1997				
Yes	16.8*	23.2	0.4	4.09
No	*25.0*	*22.8*	†	†
Parents' highest level of education				
High school or some college	21.8	22.7	-0.3	2.12
Bachelor's or higher	*24.2*	*23.1*	†	†

Table 12c—Average percent increase in full-time salary between 1994 and 1997 for 1992–93 female bachelor's degree recipients who worked full time in 1994 and 1997 and had not enrolled in graduate school, unadjusted and adjusted after controlling for variables listed in the table —Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	23.4	23.5	1.6	3.29
Part-time	23.9	23.1	1.2	2.86
Full-time	*19.2*	*21.9*	†	†
Overlapping jobs in 1997				
No	22.8	21.7	-1.4	3.06
Yes	*23.5*	*23.1*	†	†
Number of jobs worked since bachelor's				
2 or more	25.1*	24.2	3.8	2.93
1 job	*18.8*	*20.5*	†	†
Cumulative GPA				
Less than 3.0	22.4	20.9	-2.2	3.21
3.10–3.49	24.3*	23.4	0.4	2.26
3.5 or higher	*21.9*	*23.0*	†	†
Institution first attended				
Public, nondoctorate	23.8	24.0	1.5	2.64
Private, not-for-profit nondoctorate	26.1	21.3	-1.2	2.84
Private, not-for-profit doctorate	24.8	23.8	1.3	3.31
Private, for profit	27.2	26.6	4.1	6.50
Public, doctorate	*22.8*	*22.5*	†	†

‡ Too few cases for a reliable estimate.

*p< 0.05.

† Not applicable for the reference group.

[1] The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2] The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3] Least squares coefficient (see appendix B).

[4] Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5] Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

In addition to salary, college graduates also reported whether their job placed them on a definite career track and whether a degree was required for their job. Because a relatively large percentage of graduates reported either that a degree was required or that their job held definite career potential, in this analysis, the two attributes were combined into one composite variable so that only those reporting *both* job attributes were considered (38 percent of graduates). As shown in table 13, after controlling for related variables, field of study was the only variable that was significantly associated with the outcome. Specifically, engineering majors were more likely than business majors to report both job attributes. Engineering is often a highly specialized major leading to a very specific career track, which may explain why majors are so much more likely to be in a career track position requiring a bachelor's degree. However, compared with business, in no other field of study were college graduates more or less likely to report that their job was on a definite career track and that a degree was required.

In summary, the data from the models predicting 1997 full-time salaries confirm the earnings disadvantage of education majors. This remained true for both men and women when separate models were run. In addition, for men but not for women, humanities and arts majors also earned significantly less than those who majored in business. Among women, but not men, those who majored in engineering or health other than nursing enjoyed an earnings premium compared with business majors.

The data from the other two models (i.e., salary increase and career track employment) suggest that once college graduates are established in full-time employment, undergraduate major has at most a modest influence on either salary advancement or the degree of career potential that their occupations hold. However, it should be remembered that this analysis was limited to those employed full time. It is possible that major field of study may exert more influence on part-time or temporary employment earnings.

Table 13—Percentage of 1992–93 bachelor's degree recipients reporting that their April 1997 job both required a bachelor's degree and had definite career potential among those who had not enrolled in graduate school, unadjusted and adjusted for variables listed in the table

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Total	37.9	37.9	48.1	6.60
Bachelor's degree major				
Education	37.1	36.2	-1.3	5.77
Mathematics/physical sciences	41.5	40.4	3.0	9.79
Social science	32.6	32.3	-5.2	4.62
Other[5]	38.0	39.6	2.1	8.79
Engineering/architecture	53.5*	53.4*	15.9	6.23
Computer science	46.0	46.6	9.2	8.93
Health/nursing	43.4	44.8	7.3	8.25
Health/other	46.6	46.6	9.2	8.33
Communications/journalism	40.9	39.7	2.2	6.37
Social work/protective services	26.5	28.0	-9.5	9.85
Humanities and arts	33.4	32.5	-4.9	4.86
Biological/interdisciplinary sciences	37.3	37.7	0.2	7.84
Business	*37.3*	*37.4*	†	†
Gender				
Female	36.9	37.2	-1.6	3.11
Male	*39.1*	*38.8*	†	†
Race/ethnicity				
American Indian/Alaskan Native	35.6	36.7	-1.7	17.64
Asian/Pacific Islander	39.8	39.8	1.4	7.04
Black, non-Hispanic	26.6*	31.0	-7.4	6.22
Hispanic	35.0	37.3	-1.1	6.78
White, non-Hispanic	*38.9*	*38.4*	†	†
Age at bachelor's degree				
23–24	37.2	36.5	-4.9	3.66
25–29	36.6	35.3	-6.1	4.75
30 or older	33.9*	33.9	-7.5	5.66
22 or younger	*40.5*	*41.4*	†	†
Marital status in 1997				
Married/cohabit as married	39.9*	40.6	6.3	3.24
Not married	*35.3*	*34.3*	†	†
Children in 1997				
Yes	33.6*	34.7	-3.9	5.37
No	*39.5*	*38.6*	†	†
Parents' highest level of education				
High school or some college	37.4	38.0	0.1	2.98
Bachelor's or higher	*38.9*	*37.9*	†	†

Table 13—Percentage of 1992–93 bachelor's degree recipients reporting that their April 1997 job both required a bachelor's degree and had definite career potential among those who had not enrolled in graduate school, unadjusted and adjusted for variables listed in the table—Continued

	Unadjusted estimates[1]	Adjusted estimates[2]	Least squares coefficient[3]	Standard error[4]
Employment while enrolled				
No work	35.7	34.8	-4.9	4.48
Part-time	39.4	38.9	-0.8	4.07
Full-time	*36.7*	*39.7*	†	†
Cumulative GPA				
Less than 3.0	33.6*	32.8	-8.6	4.38
3.10–3.49	38.3	37.3	-4.1	3.28
3.5 or higher	*41.5*	*41.3*	†	†
Institution first attended				
Public, nondoctorate	37.6	38.7	-1.3	3.67
Private, not-for-profit nondoctorate	31.8*	32.6	-7.3	4.17
Private, not-for-profit doctorate	39.0	38.8	-1.2	4.75
Private, for profit	33.0	32.5	-7.4	7.97
Public, doctorate	*40.9*	*40.0*	†	†

*p<0.05.

†Not applicable for the reference group.

[1]The estimates are from the B&B:97 Undergraduate Data Analysis System.

[2]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect (see appendix B).

[5]Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic/personal skills, industrial arts, precision production, transportation.

NOTE: The italicized group in each category is the reference group being compared. A control was also added for number of months worked in April 1997 job.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B:93/97), Data Analysis System.

Summary and Conclusions

College graduates who received their bachelor's degree in 1992–93 entered a labor market at a time of economic recovery and prosperity. While a small proportion of them experienced unemployment, most reported working full time. However, for those who had not enrolled in graduate education by 1997 their employment outcomes did vary with undergraduate major. The findings in this study concerning salary are consistent with earlier research analyzing the effect of college major. Graduates in certain applied fields such as engineering, business, computer science, nursing, and other health fields earned higher than average salaries either when they first entered the labor market in 1994 or three years later in 1997, while those in education, social work/protective services and humanities and arts earned lower than average salaries.

However, when examining other job attributes such as job stability, job benefits, and job satisfaction, differences across fields of study were relatively modest. Consider, for example, that most college graduates (83 to 86 percent) reported that their jobs provided health insurance, paid sick leave, or paid vacations. The only field in which graduates consistently reported having these benefits less often was humanities and arts, yet three-quarters or more of these majors (77 to 79 percent) reported receiving these benefits. Similarly, there was little variation in the extent to which college graduates reported high satisfaction with job attributes other than pay. Half or more reported being very satisfied with job security (63 percent), job challenge (56 percent), fringe benefits (53 percent), co-workers (80 percent), and working conditions (56 percent). And there was little variation in satisfaction with their 1997 job with respect to major. Even when looking at salary advancement for those working full time in both 1994 and 1997, the average percent increase in salary was 25 percent, and only in the field of computer science did graduates report a higher than average increase (31 percent).

However, one field stood out from the others with respect to almost all job attributes: engineering majors consistently experienced very positive outcomes for both salary and job benefits. Not only did they report higher than average salaries but they also were more likely than all graduates to report job benefits such as health insurance, paid vacations, retirement benefits, family leave, and outside job training. College graduates who had majored in computer science fields also reported very positive outcomes relative to all graduates. They earned higher than average salaries in 1997 and were more likely than average to report most job benefits including health insurance, paid sick leave, paid vacation, retirement benefits and family leave.

Nursing majors stood out with respect to job stability. Nursing was the only field in which graduates experienced better than average job stability for all three indicators examined: they had worked in fewer jobs, experienced fewer spells of unemployment, and had worked in their April 1997 job longer than all graduates as a whole.

In contrast, education majors and humanities and arts majors fared relatively poorly compared to all graduates, especially with respect to salary. Education was the only field in which majors reported lower than average full-time salaries in both 1994 and 1997, and they experienced a lower than average salary increase between the two time periods. Humanities and arts majors reported lower than average salaries in both 1994 and 1997, and they consistently reported receiving all job benefits (health, sick leave, paid vacations, retirement benefits, family leave, and job training) less often than all graduates.

In the multivariate analysis, where specific fields of study were compared to business after holding related variables constant, education majors earned lower salaries among both men and women. The same was true for humanities and arts majors but only for men. Women who had majored in humanities and arts did not earn significantly less than business majors once related variables were controlled. In addition, among women, but not men, engineering majors and health (other than nursing) majors earned more than business majors. With respect to salary increases between 1994 and 1997, among those employed full time in both years, education was one of only two fields (nursing being the other) in which graduates earned lower salary increases than did business majors. Finally, engineering was the only field in which graduates were more likely than business majors to report that their 1997 job both required a bachelor's degree and held definite career potential.

The multivariate analysis also demonstrated that even after controlling for major, background characteristics, college GPA, and work experience, men earned considerably higher salaries than women in 1997. Several factors that influenced women's salaries in 1997 did not have a comparable effect on men's salaries. These included age at bachelor's degree (women 30 or older earned higher salaries than those under 23); race/ethnicity (female Asian/Pacific Islander graduates earned higher salaries than their white counterparts); and work experience (women who had ever worked in overlapping jobs earned less than their peers who did not). The discrepancy between factors that predict the salaries of men and women in 1997 suggests that women may be subjected to greater scrutiny than men in attaining higher paying positions in the marketplace.

There were three fields of study in which graduates appeared to reach gender equity in earnings. In the fields of engineering, health fields other than nursing, and humanities and arts men and women earned comparable salaries four years after receiving their bachelor's degree. Again,

however, these results reflect very early labor market experiences for those who never enrolled in graduate education, at most five years after college graduation. Results for longer-term effects remain to be determined from subsequent follow-up surveys of the same cohort.

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Appendix A—Glossary

This glossary describes the variables used in this report. The variables were taken directly from the B&B:1993/1997 Data Analysis System (DAS), an NCES software application that generates tables from the B&B:1993/1997 data. A description of the DAS software can be found in appendix B.

In the index below, the variables are organized by general topic and, within topic, listed in the order they appear in the report. The glossary is in alphabetical order by variable label (displayed in capital letters to the right of the name). All variables labels beginning with B2 are based on data collected in 1997.

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Student Characteristics

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Age when received bachelor's degree B2AGATBA
Race ethnicity B2ETHNIC
Gender B2RSEX
Number of months of any graduate study after bachelor's degree B2ENGRAD
Grade point average in undergraduate major ..... GPAMAJ
Undergraduate major ..... MAJWORK
Highest education level by either parent ..... PAREDUC
Marital status as of 1997 ..... B2MAR497
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April 1994 salary in 1997 constant dollars ..... SAL94_97
Percent increase between 1994 and 1997 April annual salaries ..... PCTINCR
Employment status in April 1994 ..... B2EM9404
Employment status in April 1997 ..... B2EM9704
Employment/enrollment status in April 1997 ..... B2NM9704
Total number of months unemployed B2UNEMPD
Number of unemployment spells B2UNEMSP
Average hours worked per week while enrolled EMWKHR4

Job Characteristics

Health insurance provided at April 1997 job B2AJBN01
Retirement benefits provided at April 1997 job B2AJBN02
Paid vacation provided at April 1997 job B2AJBN03
Paid sick leave provided at April 1997 job B2AJBN04
Family-related benefits provided at April 1997 job B2AJBN06
April job required college/graduate degree B2AJDEGR
Number of months worked in April 1997 job B2AJMOS
April 1997 occupation B2AJOBR
April job built on skills from other job B2AJPREV
Reasons for taking April 1997 job
- Had previous work experience in area B2AJRE03
- Related to field of study B2AJRE04
- Good income to start B2AJRE05
- Good income potential B2AJRE06
- Good job security B2AJRE07
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- Pay B2AJST01
- Fringe benefits B2AJST02
- Job challenge B2AJST03
- Working conditions B2AJST04
- Promotion opportunity B2AJST05
- Job security B2AJST06
- Co-workers B2AJST08

April 1997 job provided training in last 12 months B2EMPTRN
Number of jobs begun since bachelor's degree B2JOBN2
Total number of jobs held since last interview B2TOTALJ
Job required bachelor's degree and had definite career potential JOBBA97

S 1

Age when received bachelor's degree **B2AGATBA**

Indicates the student's age when he or she received a bachelor's degree in 1992–93.

Health insurance provided at April 1997 job **B2AJBN01**

Student's response to the following question: "(Does/Did) your job provide health or dental insurance (Yes/No)?"

Retirement benefits provided at April 1997 job **B2AJBN02**

Student's response to the following question: "(Does/Did) your job provide retirement benefits (Yes/No)?"

Paid vacation provided at April 1997 job **B2AJBN03**

Student's response to the following question: "(Does/Did) your job provide paid vacation or holidays (Yes/No)?"

Paid sick leave provided at April 1997 job **B2AJBN04**

Student's response to the following question: "(Does/Did) your job provide paid sick leave (Yes/No)?"

Family-related benefits provided at April 1997 job **B2AJBN06**

Student's response to the following question: "(Does/Did) your job provide family-related benefits such as maternity leave, child care, or elder care (Yes/No)?"

April 1997 job required college/graduate degree **B2AJDEGR**

Student's response to the following question: "Was a college degree required to obtain this job (Yes/No)?"

Number of months worked in April 1997 job **B2AJMOS**

Indicates the number of months student worked in his or her April 1997 job between 1/1/93 and 4/30/97.

April 1997 occupation **B2AJOBR**

Indicates the respondent's occupation in April 1997. For this analysis, occupations were aggregated into 12 categories, including the following:

Educators	K–12 teachers, instructors other than K–12 teachers
Business and management	Business/financial support services, financial services professionals, managers—executive, managers—midlevel, managers—supervisory, office, other
Engineering/software engineers/architecture	Engineers, architects, software engineers

Computer science	Computer systems related professions technical workers, computer programmers
Medical professionals	Medical practice professionals, medical licensed professionals, medical services
Editors writers reporters performers	Editors, writers, reporters, public relations, performers artists
Human protective service professionals	Protective services, criminal justice administrators, human services professionals
Research, scientists, technical	Scientists, statistician professionals, research assistants, laboratory technicians, technical professional workers—other, computer and computer equipment operators
Administrative clerical legal support	Secretaries, specialized secretaries, receptionists, cashiers, tellers, sales clerks, clerks—data entry, clerical—other
Mechanics, laborers	Farmers, foresters, farm forest laborers, laborer (other than farm), mechanics, repairers, service technicians, craftsmen, skilled operatives, transport operatives (other than pilots)
Service industries	Personal services, cooks, chefs, bakers, cake decorators, sales purchasing, customer service, health recreation services
Other, military, uncodeable	Military, uncodeable, other employed, unemployed homemakers, unemployed - other

April 1997 job built on skills from other job **B2AJPREV**

Student's response to the following question: "Does Did your position build on specific skills or knowledge acquired in previous jobs (Yes No)?"

Reasons for taking April 1997 job

Student's responses to the following question: "Why did you accept this position?"

Previous work experience in the area	**B2AJRE03**
Related to field of study	**B2AJRE04**
Good income to start	**B2AJRE05**
Good income potential	**B2AJRE06**
Job security	**B2AJRE07**
Better opportunity for advancement	**B2AJRE08**
Interesting work	**B2AJRE10**
Intellectually challenging work	**B2AJRE11**

Satisfaction with aspects of April 1997 job

Student's response to the following question: "(Are/were) you very satisfied, somewhat satisfied, or dissatisfied with the following aspects of your employment"?

The pay	**B2AJST01**
The fringe benefits	**B2AJST02**
The importance and challenge of your job	**B2AJST03**
The working conditions	**B2AJST04**
Your opportunity for promotion	**B2AJST05**
Your job security	**B2AJST06**
Your relationship with co-workers	**B2AJST08**

Dissatisfied
Somewhat satisfied
Very satisfied

Annual salary for April 1997 job **B2APRSAL**

Total annual salary of April 1997 job was calculated using items on pay rate and salary. The original wording was as follows: "How much were you earning at [JOB] in the last month you were employed? [ELSE] in April of this year? Include any commissions, tips or bonuses."

Less than $25,000
$25,000–34,999
$35,000–49,999
$50,000 or more

Children as of 1997 **B2CHLD**

Response to question "Do you have any children? Please include adopted, foster, and step children." (Yes/No)

Employment status April 1994 **B2EM9404**

Indicates the student's employment status in April 1994 as reported by the student.

Full-time	Work 35 or more hours
Part-time	Work less than 35 hours
Unemployed	Not working but actively looking for work, with or without unemployment benefits
Out of labor force	Not working and not looking for work

S1

Employment status April 1997 **B2EM9704**

Indicates the student's employment status in April 1997 as reported by the student.

Full-time	Work 35 or more hours
Part-time	Work less than 35 hours
Unemployed	Not working but actively looking for work, with or without unemployment benefits
Out of labor force	Not working and not looking for work

April 1997 job provided training in last 12 months **B2EMPTRN**

Student's response to the question "In the last twelve months, did your job provide any training other than informal on-the-job training or tuition-reimbursed courses taken through a regular college (Yes/No)?"

If yes, student was asked how many courses, formal training seminars, or other employer-provided training activities he or she participated in.

Number of months of any graduate study after bachelor's degree **B2ENGRAD**

Indicates the total number of months of graduate study since completion of bachelor's degree. Used to filter out those with any graduate study (B2EJGRAD=0).

Race/ethnicity **B2ETHNIC**

Indicates the student's race and ethnicity.

American Indian/Alaskan native	A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
Asian or Pacific Islander	A person having origins in any of the peoples of the Far East, Southeast Asia, the Indian Subcontinent, or Pacific Islands. This includes people from China, Japan, Korea, the Philippine Islands, Samoa, India, and Vietnam.
Black, non-Hispanic	A person having origins in any of the black racial groups of Africa, not of Hispanic origin.
Hispanic	A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
White, non-Hispanic	A person having origins in any of the original peoples of Europe, North Africa, or the Middle East (except those of Hispanic origin).

Full-time/part-time April 1997 job **B2FPJOB**

Full-time part-time status of main job held in April 1997. "Full time" is defined as 30 or more hours per week, except for those who were teaching in April 1997, in which case "full time" was defined by the respondent.

Full-time
Part-time

Number of jobs begun since bachelor's degree **B2JOBN2**

Indicates number of jobs begun since receiving a bachelor's degree.

One
Two
Three or more jobs

Marital status as of April 1997 **B2MAR497**

Indicates student's marital status as of April 1997. For this analysis, the categories were defined as follows:

Single, never married
Married or cohabit as married
Divorced, separated, or widowed

Employ/enroll status April 1997 **B2NM9704**

Indicates the employment enrollment status of respondent in April 1997.

Full-time enrolled
  Employed
  Not employed
Part-time enrolled
  Employed
  Not employed
Not enrolled but employed
Neither enrolled nor employed

Gender **B2RSEX**

Male
Female

Total number of jobs held since last interview **B2TOTALJ**

Calculated total number of jobs (teaching and non-teaching) since last interview in 1994.

None
1
2
3
4
5 or more

Total number of months unemployed **B2UNEMPD**

Longest period of continuous unemployment (in months) since graduation.

Number of unemployment spells **B2UNEMSP**

The total number of spells (continuous month(s)) of unemployment since graduation.

Average hours work/week while enrolled **EMWKHR4**

Average hours worked per week while enrolled 1992-93 revised. The variable is a revised version of EMWKHR3 which classified students who worked during 1992-93 but did not work while enrolled as missing.

Grade point average in undergraduate major **GPAMAJ**

Student-reported grade point average in undergraduate major.

Job required bachelor's degree and had definite career potential **JOBBA97**

Indicates whether or not a bachelor's degree was required for the April 1997 job and its level of career potential (Yes/No).

Field-of-study, first major recoded **MAJWORK**

Identifies the graduate's undergraduate major field of study, based on first major listed on students' transcripts. For this analysis, the categories were aggregated as follows:

Education	Early childhood, elementary, secondary, special, physical, other.
Business	Accounting, finance, business management systems, management/business administration, marketing/distribution.
Engineering/architecture	Architecture, engineering—electrical, chemical, civil, mechanical, other, technology.
Computer science	Computer programming, computer and information sciences.

Health/nursing	Health—nursing.
Health/other	Allied health—dental/medical tech, community/mental health, nurse assisting, general and other, health—phys ed/recreation (HPER), audiology, clinical health science, health/hospital administration, other, dietetics.
Communications/journalism	Journalism, communications, communication technology.
Humanities/arts/history/liberal studies	American civilization, area studies, African American studies, ethnic studies, Spanish, foreign languages—non-European, European, letters—English/American literature, creative/technical writing, other, liberal studies, women's studies, philosophy, religious studies, history, design, speech/drama, film arts, music, art history/fine arts, fine and performing arts—other.
Biological/interdisciplinary sciences	Biological science—zoology, botany, biochemistry, other, biophysics, interdisciplinary—environmental studies, biopsychology, integrated/general.
Mathematics/physical sciences	Mathematics—statistics, physical science—chemistry, earth science, physics.
Social work/protective services	Clinical pastoral care, protective services, social work, public administration.
Social sciences	Psychology, anthropology/archaeology, economics, geography, sociology, political science, international relations, city planning.
Other	Agriculture, agricultural science, natural resources, forestry, textiles, home economics—other, vocational home economics guidance, law—paralegal, includes pre-law, law, library/archival science, military science, interdisciplinary—other, leisure studies, basic/personal skills, industrial arts—construction, commercial art, precision production, transportation—air.

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Highest education level by either parent **PAREDUC**

Student's response to the question "What is the highest grade or level of education completed by either of your parents?"

High school or less	Less than high school GED High school graduation
Some college	1 year but less than 2 years Less than 2 years of college Associate's degree
Bachelor's or higher	Bachelor's degree (4–5 year degree) Master's degree or equivalent First professional degree Other advanced professional degree Doctorate (PhD, EdD)

Percent increase between 1994 and 1997 April annual salaries **PCTINCR**

Percent increase between April 1994 salary (adjusted to 1997 dollars) and April 1997 salary. If the percent increase was less than zero, it was re-coded to zero. Salaries less than $500 or greater than $1,000,000 were excluded (approximately 12 cases). If either the 1994 or the 1997 salary was missing, the variable was coded as missing.

April 1994 annual salary in 1997 constant dollars **SAL94_97**

April 1994 annual salary adjusted with the Consumer Price Index (CPI) to 1997 dollars. The ratio of 1997 to 1994 CPI is 1.083, which is what 1994 salary was multiplied by to calculate 1997 dollars.

Institution type **SECTOR_B**

Institution type (level and control).

Public, less-than-2-year
Public, 2-year
Public, non-PhD granting
Public, PhD granting
Private, not-for-profit, less-than-4-year
Private, not-for-profit, 4-year, non-PhD granting
Private, not-for-profit, 4-year, PhD granting
Private, for-profit, less-than-2-year
Private, for-profit, 2-years-or-more

Appendix B—Technical Notes and Methodology

The Baccalaureate and Beyond Longitudinal Study[11]

The data analyzed in this report came from the First and Second Follow-ups of the Baccalaureate and Beyond Longitudinal Study (B&B:93/94 and B&B:93/97), a study that tracks the experiences of a cohort of college graduates who received baccalaureate degrees during the 1992–93 academic year and were first interviewed as part of the National Postsecondary Student Aid Study (NPSAS:93). This group's experiences in the areas of academic enrollments, degree completions, employment, public service, and other adult decisions have been followed through 1997. The data derived from this survey provide critical information about college graduates' postsecondary education outcomes, including graduate and professional program access, labor market experience, and rates of return on investment in education.

The B&B: 93/94 survey was the first follow-up interview of NPSAS:93 participants who received their bachelor's degrees between July 1992 and June 1993. Of 12,500 NPSAS:93 respondents who were identified as potentially eligible for the first follow-up survey, about 1,500 were determined to be ineligible. A total of 10,080 eligible individuals completed the 1994 interview.

The B&B:93/97 survey is the second follow-up interview of the B&B cohort. The first followup interview (B&B:93/94) collected information from respondents 1 year after they received the bachelor's degree; the second follow-up (B&B:93/97) collected data 4 years after they received the bachelor's degree. Data collection for B&B:93/97 took place between April and December 1997. A total of 11,192 individuals in the B&B cohort were determined eligible for follow-up in 1997. For the second followup, the number of interviews completed was 10,093, yielding a response rate of 90 percent. A total of 9,274 individuals (83 percent of the sample) responded to all three rounds of the B&B study. Referred to as "the B&B panel sample," these respondents became the base sample of the analyses presented in this report.

The NPSAS:93 sample, while representative and statistically accurate, was not a simple random sample. Instead, the survey sample was selected using a more complex three-step proce-

[11]The text in this section is based on excerpts from the *Baccalaureate and Beyond Longitudinal Study: 1993/97 Methodology Report*. (NCES 1999–159) (Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1999).

dure with stratified samples and differential probabilities of selection at each level. Postsecondary institutions were initially selected within geographic strata. Once institutions were organized by zip code and state, they were further stratified by control (i.e., public; private, not-for-profit; or private, for-profit) and degree offering (less-than-2-year, 2- to 3-year, 4-year nondoctorate-granting, and 4-year doctorate-granting).[11]

For more information about the NPSAS:93 survey, refer to the *Methodology Report for the National Postsecondary Student Aid Study, 1992–93* (NCES 95–211, Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1995). For more information on procedures for the Baccalaureate and Beyond First Follow-up Study (B&B:93/94), consult the Baccalaureate and Beyond Longitudinal Study Methodology Reports (NCES 96–149 and NCES 1999–159, Washington, DC: U.S. Department of Education, National Center for Education Statistics, 1996. For second follow-up, consult NCES 1999–159).

Sample weights. B&B:93/97 final weights were calculated by making a nonresponse adjustment to the baseline B&B weight calculated for B&B:93/94. This baseline B&B weight is an adjustment of the baseline NPSAS:93 weight. All analyses in this report are weighted to compensate for unequal probability of selection into the B&B sample and to adjust for nonresponse. The B&B panel weight, based on respondents who participated in all three surveys, is used in the report. A complete description of the weighting methodology is available in the methodology reports cited above.

Accuracy of Estimates

The statistics in this report are estimates derived from a sample. Two broad categories of error occur in such estimates: sampling and nonsampling errors. Sampling errors occur because observations are made only on samples of students, not on entire populations. Surveys of population universes are not subject to sampling errors. Estimates based on a sample will differ somewhat from those that would have been obtained by a complete census of the relevant population using the same survey instruments, instructions, and procedures. The standard error of a statistic is a measure of the variation due to sampling; it indicates the precision of the statistic obtained in a particular sample. In addition, the standard errors for two sample statistics can be used to estimate the precision of the difference between the two statistics and to help determine whether the difference based on the sample is large enough so that it represents the population difference.

[11]The NPSAS universe excludes institutions offering only correspondence courses, institutions enrolling only their own employees, and U.S. service academies. For this B&B cohort, institutions were further stratified by the number of degrees in education they had awarded in the past.

Nonsampling errors occur not only in sample surveys but also in complete censuses of entire populations. Nonsampling errors can be attributed to a number of sources: inability to obtain complete information about all students in all institutions in the sample (some students or institutions refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, sampling, and imputing missing data. Although nonsampling errors due to questionnaire and item nonresponse can be reduced somewhat by the adjustment of sample weights and imputation procedures, correcting nonsampling errors or gauging the effects of these errors is usually difficult.

Data Analysis System

The estimates presented in this report were produced using the B&B:93/97 Data Analysis System (DAS). The DAS software makes it possible for users to specify and generate their own tables from the B&B:93/97 data. With the DAS, users can replicate or expand upon the tables presented in this report. In addition to the table estimates, the DAS calculates proper standard errors[12] and weighted sample sizes for these estimates. For example, table B1 contains estimated standard errors that correspond to the estimates presented in table 2 and was generated by the B&B:93/97 DAS. If the number of valid cases is too small to produce a reliable estimate (fewer than 30 cases), the DAS prints the message "low N" instead of the estimate.

In addition to tables, the DAS will also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFTs) for each variable in the matrix. Since statistical procedures generally compute standard errors based on an assumption of simple random sampling, the standard errors must be adjusted with the design effects to take into account B&B's complex sample design. (See discussion under "Statistical Procedures" below for the adjustment procedure.)

For more information about the B&B:93/97 and other Data Analysis Systems, consult the NCES DAS website (nces.ed.gov/das) or contact:

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[12]The B&B sample is not a simple random sample, and therefore simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples. The method for computing sampling errors used by the DAS involves approximating the estimator by the linear terms of a Taylor series expansion. The procedure is typically referred to as the Taylor series method.

Table B1—Standard errors for table 2: Percentage distribution of major field of study for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997

	Applied fields								Academic fields				
	Education	Business	Engineering/ architecture	Computer science	Health nursing	Health other	Communications/ journalism	Social work/ protective services	Humanities and arts	Biological/ interdisciplinary sciences	Mathematics/ physical sciences	Social sciences	Other*
Total	0.50	1.07	0.53	0.25	0.36	0.37	0.45	0.25	0.59	0.31	0.24	0.59	0.40
Gender													
Male	0.49	1.62	1.00	0.41	0.16	0.35	0.61	0.33	0.85	0.40	0.40	0.81	0.55
Female	0.76	1.18	0.29	0.28	0.61	0.52	0.53	0.33	0.76	0.44	0.26	0.81	0.49
Race/ethnicity													
American Indian/ Alaskan Native	2.93	7.72	3.46	6.30	2.29	3.21	2.18	1.70	6.21	1.77	1.77	8.57	6.86
Asian/ Pacific Islander	0.87	7.83	2.57	1.99	1.14	1.25	1.53	0.52	2.27	1.43	1.56	3.14	0.90
Black, non-Hispanic	1.01	3.44	1.31	1.27	1.58	0.84	1.37	0.83	2.25	1.88	0.51	2.69	0.67
Hispanic	2.23	3.54	1.57	1.13	1.46	1.72	1.28	1.70	2.30	1.19	0.70	2.28	1.59
White, non-Hispanic	0.56	1.12	0.55	0.24	0.37	0.39	0.51	0.27	0.63	0.31	0.26	0.62	0.44
Age at bachelor's degree													
22 or younger	0.63	1.37	0.67	0.30	0.33	0.38	0.81	0.35	0.86	0.43	0.39	0.94	0.57
23–24	0.84	2.01	1.05	0.41	0.48	0.57	0.79	0.52	1.08	0.53	0.49	1.10	0.77
25–29	1.01	2.51	1.11	0.83	0.78	0.71	0.69	0.42	1.36	1.10	0.53	1.34	0.85
30 or older	1.18	2.66	0.81	0.69	1.11	1.07	0.53	0.53	1.37	0.49	0.52	1.37	0.57
Parents' highest level of education													
High school or less	0.84	1.68	0.61	0.40	0.58	0.55	0.64	0.42	0.98	0.51	0.46	0.98	0.52
Some postsecondary education	0.81	2.55	1.05	0.45	0.76	0.65	0.76	0.54	1.14	0.53	0.44	1.21	0.99
Bachelor's degree	0.84	1.83	1.05	0.48	0.69	0.61	0.95	0.47	1.06	0.53	0.56	1.12	0.71
Advanced degree	0.90	1.83	0.93	0.58	0.41	0.67	0.93	0.30	1.31	0.81	0.45	1.28	0.64
Marital status in 1997													
Never married	0.50	1.38	0.70	0.38	0.32	0.41	0.83	0.36	0.93	0.49	0.40	0.92	0.52
Married/ cohabit as married	0.75	1.44	0.67	0.35	0.51	0.52	0.45	0.32	0.73	0.41	0.32	0.77	0.55
Divorced/ separated/ widowed	1.97	3.79	1.12	0.78	1.44	1.42	0.96	1.00	2.34	1.40	0.46	1.98	0.85

Table B1—Standard errors for table 2: Percentage distribution of major field of study for 1992–93 bachelor's degree recipients who had not enrolled in graduate education by 1997—Continued

	Applied fields								Academic fields				
	Education	Business	Engineering: architecture	Computer science	Health: nursing	Health: other	Communications: journalism	Social work: protective services	Humanities and arts	Biological interdisciplinary sciences	Mathematics: physical sciences	Social sciences	Other*
Undergraduate GPA													
Less than 3.0	0.76	2.14	1.35	0.57	0.50	0.56	1.01	0.56	1.17	0.84	0.48	1.41	0.81
3.0 to 3.49	0.56	1.57	0.74	0.34	0.44	0.39	0.69	0.32	0.81	0.46	0.41	0.87	0.57
3.5 or higher	0.96	1.71	0.56	0.42	0.67	0.67	0.60	0.40	1.00	0.39	0.40	0.93	0.53
Institution type													
Public													
Doctorate	0.74	1.49	0.98	0.44	0.67	0.69	0.77	0.30	0.92	0.49	0.42	0.90	0.69
Nondoctorate	1.21	1.78	0.75	0.47	0.53	0.52	0.64	0.57	1.05	0.68	0.52	0.99	0.89
Private, not-for-profit													
Doctorate	1.15	2.57	1.58	0.44	0.76	0.93	1.71	0.50	2.05	0.71	0.51	2.31	0.43
Nondoctorate	1.05	2.68	0.53	0.57	0.75	0.81	0.78	0.83	1.36	0.56	0.32	1.20	0.69
Private, for profit	1.08	11.12	3.56	1.85	1.81	2.07	1.97	0.29	2.72	1.87	0.70	4.69	2.98

*Other includes agriculture, natural resources, forestry, textiles, home economics, law, library science, military science, leisure studies, basic personal skills, industrial arts, precision production, transportation.

NOTE: Details may not sum to 100 due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1992–93 Baccalaureate and Beyond Longitudinal Study, Second Follow-up (B&B 93/97), Data Analysis System.

Statistical Procedures

Differences Between Means

The descriptive comparisons were tested in this report using Student's *t* statistic. Differences between estimates are tested against the probability of a Type I error,[13] or significance level. The significance levels were determined by calculating the Student's *t* values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's *t* values may be computed to test the difference between estimates with the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}} \qquad (1)$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, a covariance term must be added to the formula:

$$\frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1\ se_2}} \qquad (2)$$

where r is the correlation between the two estimates.[14] This formula is used when comparing two percentages from a distribution that adds to 100. If the comparison is between the mean of a subgroup and the mean of the total group, which is the primary comparison in this report, the following formula is used:

$$\frac{E_{sub} - E_{tot}}{\sqrt{se_{sub}^2 + se_{tot}^2 - 2p\,se_{sub}^2}} \qquad (3)$$

[13]A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

[14]U.S. Department of Education, National Center for Education Statistics, A Note from the Chief Statistician, no. 2, 1993.

where p is the proportion of the total group contained in the subgroup.[15] The estimates, standard errors, and correlations can all be obtained from the DAS.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large t statistics may appear to merit special attention. This can be misleading since the magnitude of the t statistic is related not only to the observed differences in means or percentages but also to the number of students in the specific categories used for comparison. Hence, a small difference compared across a large number of students would produce a large t statistic.

A second hazard in reporting statistical tests for each comparison occurs when making multiple comparisons among categories of an independent variable. For example, when making paired comparisons among different levels of income, the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics or "families" are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together.

Comparisons were made in this report only when $p \leq .05/k$ for a particular pairwise comparison, where that comparison was one of k tests within a family. This guarantees both that the individual comparison would have $p \leq .05$ and that for k comparisons within a family of possible comparisons, the significance level for all the comparisons will sum to $p \leq .05$.[16]

For example, in a comparison of males and females, only one comparison is possible (males versus females). In this family, $k=1$, and the comparison can be evaluated without adjusting the significance level. When students are divided into five racial/ethnic groups and all possible comparisons are made, then $k=10$ and the significance level of each test must be $p \leq .05/10$, or $p \leq .005$. The formula for calculating family size (k) is as follows:

$$k = \frac{j(j-1)}{2} \tag{4}$$

where j is the number of categories for the variable being tested. In the case of race/ethnicity, there are five racial/ethnic groups (American Indian/Alaskan Native; Asian/Pacific Islander; black, non-Hispanic; Hispanic; and white, non-Hispanic), so substituting 5 for j in equation 4,

[15]Ibid.

[16]The standard that $p \leq .05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p \leq .05$. For tables showing the t statistic required to ensure that $p \leq .05/k$ for a particular family size and degrees of freedom, see Olive Jean Dunn, "Multiple Comparisons Among Means," *Journal of the American Statistical Association* 56 (1961): 52–64.

$$k = \frac{5(5-1)}{2} = 10$$

Adjustment of Means to Control for Background Variation

Tabular results are limited by sample size when attempting to control for additional factors that may account for the variation observed between two variables. For example, when examining the percentages of those who completed a degree or were still enrolled in postsecondary education 3 years after their initial enrollment, it is impossible to know to what extent the observed variation is due to socioeconomic status (SES) differences and to what extent it is due to differences in other factors related to SES, such as type of institution attended, intensity of enrollment, and so on. However, if a nested table were produced showing SES within type of institution attended within enrollment intensity, the cell sizes would be too small to identify the patterns. When the sample size becomes too small to support controls for another level of variation, one must use other methods to take such variation into account.

To overcome this difficulty, multiple linear regression was used to obtain means that were adjusted for covariation among a list of control variables.[17] Adjusted means for subgroups were obtained by regressing the dependent variable on a set of descriptive variables such as gender, race–ethnicity, SES, and so on. Substituting ones or zeros for the subgroup characteristic(s) of interest and the mean proportions for the other variables results in an estimate of the adjusted proportion for the specified subgroup, holding all other variables constant. For example, consider a hypothetical case in which two variables, age and gender, are used to describe an outcome, Y (such as percentage of graduates working in a job requiring a bachelor's degree and with definite career potential). The variables age and gender are recoded into a dummy variable representing age, A, and a dummy variable representing gender, G:

Age	A
24 years or older	1
Less than 24 years old	0
and	
Gender	G
Female	1
Male	0

The following regression equation is then estimated from the correlation matrix output from the DAS:

[17] For more information about weighted least squares regression, see Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Vol. 22 (Beverly Hills, CA: Sage Publications, Inc., 1980); William D. Berry and Stanley Feldman, *Multiple Regression in Practice*, Vol. 50 (Beverly Hills, CA: Sage Publications, Inc., 1987).

$$\hat{Y} = a + b_1 A + b_2 G \quad (5)$$

To estimate the adjusted mean for any subgroup evaluated at the mean of all other variables, one substitutes the appropriate values for that subgroup's dummy variables (1 or 0) and the mean for the dummy variable(s) representing all other subgroups. For example, suppose Y represents attainment, and is being described by age (A) and gender (G), coded as shown above, with means as follows:

Variable	Mean
A	0.355
G	0.521

Next, suppose the regression equation results in:

$$\hat{Y} = 0.15 + 0.17A + 0.01G \quad (6)$$

To estimate the adjusted value for older students, one substitutes the appropriate parameter estimates and variable values into equation 6.

Variable	Parameter	Value
a	0.15	—
A	0.17	1.000
G	0.01	0.521

This results in:

$$\hat{Y} = 0.15 + (0.17)(1) + (0.01)(0.521) = 0.325$$

In this case, the adjusted mean for older students is 0.325 and represents the expected outcome for older students who resemble the average student across the other variables (in this example, gender). In other words, the adjusted percentage who worked in a job requiring a bachelor's degree with definite career potential controlling for age and gender is 32.5 percent (0.325 x 100 for conversion to a percentage).

It is relatively straightforward to produce a multivariate model using the DAS, since one of the DAS output options is a correlation matrix, computed using pairwise missing values. In regression analysis, there are several common approaches to the problem of missing data. The two simplest are pairwise deletion of missing data and listwise deletion of missing data. In pairwise

deletion, each correlation is calculated using all of the cases for the two relevant variables. For example, suppose you have a regression analysis that uses variables X1, X2, and X3. The regression is based on the correlation matrix between X1, X2, and X3. In pairwise deletion the correlation between X1 and X2 is based on the nonmissing cases for X1 and X2. Cases missing on either X1 or X2 would be excluded from the calculation of the correlation. In listwise deletion the correlation between X1 and X2 would be based on the nonmissing values for X1, X2, and X3. That is, all of the cases with missing data on any of the three variables would be excluded from the analysis.[18]

The correlation matrix can be used by most statistical software packages as the input data for least squares regression. That is the approach used for this report, with an additional adjustment to incorporate the complex sample design into the statistical significance tests of the parameter estimates (described below). For tabular presentation, parameter estimates and standard errors were multiplied by 100 to match the scale used for reporting unadjusted and adjusted percentages.

Most statistical software packages assume simple random sampling when computing standard errors of parameter estimates. Because of the complex sampling design used for the NPSAS survey, this assumption is incorrect. A better approximation of their standard errors is to multiply each standard error by the design effect associated with the dependent variable (DEFT),[19] where the DEFT is the ratio of the true standard error to the standard error computed under the assumption of simple random sampling. It is calculated by the DAS and produced with the correlation matrix.

[18]Although the DAS simplifies the process of making regression models, it also limits the range of models. Analysts who wish to use an approach other than pairwise treatment of missing values or to estimate probit/logit models (which are the most appropriate for models with categorical dependent variables) can apply for a restricted data license from NCES. See John H. Aldrich and Forrest D. Nelson, Linear Probability, Logit and Probit Models (*Quantitative Applications in Social Sciences*, Vol. 45) (Beverly Hills, CA: Sage, 1984).

[19]The adjustment procedure and its limitations are described in C.J. Skinner, D. Holt, and T.M.F. Smith, eds., *Analysis of Complex Surveys* (New York: John Wiley & Sons, 1989).